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PREVENTING THE SALE OF HAZARDOUS ELECTRICAL DEVICES.

Electrical inspection has been confined almost exclusively heretofore to the supervision of the more or less permanent electric circuits and apparatus installed in or on buildings. Very little attention has been given to portable devices and utensils that may be connected to the circuits after the latter have been inspected and approved. This is perhaps more particularly true of municipal inspectors than of those acting in behalf of the fire-insurance interests. Two causes accountable for this are the usual dearth of inspectors and in many cases lack of knowledge of the use of new portable equipment.

Cases come up occasionally, however, in which some unscrupulous or ignorant manufacturer or dealer places on the market an electrical device of such poor and flimsy construction that its use is likely to produce hazard to innocent buyers. An instance of this kind has been called to our attention in which an electric toy lantern, including two lamps to be connected to any standard lighting circuit, was sold by a large department store. The porcelain lamp receptacles were of the cheapest possible construction and had a tin base in close proximity to the lamp terminals; the body of the attachment plug was of wood, to which the screw shell was tacked with brass brads, one of the wires being held by the same means. It would have been bad enough to impose such a contraption on any one, but to perpetrate it on an innocent young child is manifestly worse, since toys as a rule do not receive very gentle treatment. Such an outfit brings discredit on things electrical. It is fortunate that damage from defective electrical devices has been relatively small and electrical manufacturers must be given credit for generally turning out products of reputable character. The danger is from manufacturers not versed in electrical matters or those who wish to take unfair advantage of the popularity of electrical appliances.

The simplest and most effective way to meet this danger is by an increase of the authority of municipal electrical inspectors so that they may have the right not only to prohibit the use but also the sale of devices or apparatus that are manifestly of hazardous construction. The easiest way to prevent use is to prevent sale. This is shown by the agitation for a sane Fourth of July. Nearly every city has had ordinances in force for many years that forbade the firing of giant crackers, guns, cannons, etc., but it

would have required an army many times the size of the police force to enforce them strictly. When ordinances forbidding or restricting the sale of fireworks and dangerous weapons were passed, it was found relatively easy to enforce them, because the number of dealers is always only a small fraction of the number of buyers. The result has been that we are approaching a really sane national holiday in every city that has taken this means of bringing it about.

Of course, it will be asserted by those affected that prohibiting sales is increasing the paternalism of our government, but is not the preventing of danger to the public a most important function of government? If a man wishes to play with dynamite, he may do so to heart's content as long as he does not jeopardize the lives and property of others. So, if a man wishes to make and use a defective electrical device himself let him do so, but if he imposes its use on an innocent public he should be stopped by the power of the law. The electrical industry will be far better off by the elimination of any electric device, fitting, tool, fixture, utensil or other appliance that instead of being useful and reliable, constitutes a hazard from the liability of fire or shock.

CHRISTMAS FIRE HAZARDS.

Christmas and its joys should not be allowed to blind men to the ordinary rules of safety for the protection of the home and the lives of the family. And yet at holiday times parents who try to keep their children free from even the possibility of danger will install in the heart of their homes, where it is sure to be the center of attraction for the little ones, the most inflammable thing that ever enters it—the ordinary evergreen Christmas tree. While it grows more dry and dangerous in the warm rooms they drape it with cotton for snow, tissue-paper loops and tinsel for decorations, stick candles all over it, hang up toys that every child will grab for, and then trust to luck and providence for safety from a hazard that may prove as dangerous and as deadly as a rattlesnake or an open keg of gunpowder. Just to play fair and take his share of the chances, the head of the family often surrounds himself with pillows, puts on cotton hair and whiskers and makes himself more of a menace than a help in case a fire should start. And fires do start—thousands of them every holiday season. Firemen look forward to a run of Christmas-tree fires just as they did to Fourth-of-July fires before the sane-Fourth movement put an end to them in many places. Why not a sane Christmas as well as a sane Fourth? Why should the children's festival be made the means of destroying hundreds of lives and thousands of homes? Use little electric lamps instead of candles, asbestos instead of cotton, non-combustible decorations instead of inflammables, and then watch the tree with the utmost care, especially when the children are around it. It is better to be safe than sorry, especially with the little ones at Christmas time.

VALUATION OF LAND FOR RATE-MAKING PURPOSES.

One of the fundamental steps in rate-making is a determination of the value of the physical property which is being used by any utility in furnishing service. Different methods have been proposed for carrying out this valuation, among which may be mentioned the original cost of the property and the reproduction value as determined by appraisal. The latter is based upon the idea of determining what it would cost at the present time to assemble the property now in use and place it in readiness to give service.

The determination of the value of the land used by the public utility would appear to constitute one of the problems of least difficulty in this connection, and in fact it is not very difficult to appraise the value of a given parcel of land. However, the question as to whether the present value or the original cost should be included in an appraisal is one which depends upon the theory of valuation upon which an appraisal is based. The site value of land is a thing which seldom remains fixed, as the value will generally be found to either appreciate or depreciate. In growing and enterprising communities, land in favorable, or even in unfavorable locations if they are at all central, will be found to appreciate. In some instances, however, where a town has been undergoing a boom at the time of purchase, the original cost may have been greater than the present value. This was the case, for instance, in the city of Superior, Wis., where rates of the public service company have been under investigation by the Wisconsin Railroad Commission.

In considering whether original cost or present value should be used in an appraisal, the possibility of either of these conditions should be borne in mind. In cases where the value of either land or other property is depreciated through causes not connected with wear, obsolescence, etc., and which cannot, therefore, well be included in the depreciation account, the cost-of-reproduction theory appears to do an injustice to the investor, supposing the property to have been purchased at what was the prevailing market price at the time. If the utility company is never to be allowed a value greater than that represented by present market prices, the assumption is being made, either consciously or unconsciously, that its past history is not concerned in the problem. It is assumed that service should be supplied just as economically as if this service were to be inaugurated at the present time, and that if this cannot be done with an old plant, such a plant should never have been constructed in the past. That is, if the construction of machinery has been cheapened, the previous investor must be penalized therefor. The logical result of this theory is to say that no investment in plant should be made, and consequently no service rendered, in any line in which it will in future be possible to construct an equivalent plant more

cheaply. This consideration is entirely extraneous to the question of ordinary depreciation from wear and tear, or obsolescence due to progress in the art. If the theory of reproduction value is to be adhered to, it would seem only logical to permit at the present time extra earnings designed to cover future declines in the market value of either real or personal property. Since, however, such a decline in value can almost never be foreseen or accurately estimated, the proper amount of such an allowance is indeterminable.

Where the site value of land increases, we have the converse of this condition. The company is now using in its service property which has greater value than its cost price, and the increase does not represent any investment upon which a return should properly be made. The increase in the value of land is one which is principally dependent upon the growth of the community and the congestion of population, and depends no more upon the efforts of the utility company than upon those of every other industrious and enterprising inhabitant of the city who aids in developing the community. The additional value which has come into existence is socially created. This additional value becomes the property of the utility company, which holds the legal title to this unearned increment. The community has thus already contributed something of value to the utility company. Why should it also contribute in the form of rates to a fixed charge constituting interest upon a value which it has itself created and which does not represent any investment? The fact that the utility company must pay increased taxes due to higher valuation of its property is already covered in the fact that taxes are charged in the expense account.

Somewhat similar considerations apply to a case where construction work or machinery is valued higher than its original cost, owing to the fact that labor charges or other manufacturing costs have increased. A difference exists in that here the values are not created by the growth of the community, but rather by industrial conditions. The increase in value may never be realized in cash to the utility company, since the article to which it attaches will in time wear out and be discarded. The depreciation charges, however, if properly based upon its original cost, will before the end of its life have made up the original cost; so that when the article is replaced, if market prices are then higher, a larger investment will be represented and will then be entitled to appropriate interest charges.

In such cases as those here represented, cost of reproduction as a basis of appraisal does not seem so equitable as the figures for original cost. In many cases, however, the latter are no longer available, due either to obscure methods of book-keeping or to the destruction of original records, and appraisers are necessarily forced to base their estimates upon present values.

THE MELBOURNE ELECTRIFICATION.

Upon another page of this issue will be found a brief summary of the report which has been made regarding the electrification of the suburban steam railroads centering in Melbourne, Australia. Owing to the doubt as to which system of electric operation would be most advantageous, plans were drawn up for alternative methods, using direct current and single-phase alternating current, the generation and transmission of the power to be the same for both cases. Bids were received from manufacturers with reference to both schemes, and the most favorable bids for each have been taken for comparison.

The report shows that for the conditions existing at Melbourne both the initial cost of installation and the operating cost will be less with the use of direct current at 1,500 volts than under a single-phase system where the voltage supplied is 11,000.

The proposition dealt with involved about 300 miles of trackage and it is expected that within a few years traffic would reach 150,000,000 passengers per year.

While the extension of electrification to the through lines which extend beyond the suburban zone would make a more favorable case for single-phase electrification, it is found that even for these conditions the cost of a direct-current scheme is somewhat less both in regard to initial cost and operation, although the difference in this case is small.

This report on the Melbourne electrification will be of great interest to electrical engineers who are concerned with electrification problems. While advocates of different methods have continually maintained that the cost advantages lay with their respective methods, there has been heretofore little opportunity to compare the relative merits of the two systems under identical conditions. In the case here considered victory appears to rest with the direct-current system. This serves to indicate that where the voltage is made as high as 1,500 volts, the direct-current system will be an active competitor in the field where single-phase has heretofore been regarded as possessing greater advantages.

ELECTRICAL REVIEW OF LONDON CELEBRATES ITS FORTIETH ANNIVERSARY.

The *Electrical Review* of London, our esteemed British contemporary, on November 15 celebrated its fortieth anniversary. The publication was established on November 15, 1872. It was issued at first as an 18-page pamphlet as a monthly, becoming a bi-weekly six months later, and appearing in this form for three years, when it became a weekly of its present dimensions. Many of the men who have contributed to the upbuilding of this great technical journal have passed away, but among the distinguished engineers who are still living and who at considerable sacrifice helped to launch the ship and keep it on its course, is Sir William Preece, who upon this occasion has contributed a most interesting article entitled "Many Happy Returns."

The Utah Electric Club.

On December 5, at a luncheon in the Gold Room of the Commercial Club, Salt Lake City, the Utah Electric Club was organized with 140 charter members. This new club is destined to become one of the leading commercial and technical organizations of Utah. Its object is to promote the social intercoarse, recreation and culture of the members, and to advance the commercial interests of Utah. Any person interested in any branch of the Electrical industry may become a member.

The following board of directors was elected for the ensuing year: president, C. B. Hawley, manager of the Intermountain Electric Company; vice-president, H. H. Bucks, chief electrician of the Oregon Short Line Railroad; secretary-treasurer, W. W. Torrence, manager of the General Electric Company; directors, John Jones, manager of the Westinghouse Electric Company, H. M. Fennemore, of the Mountain States Telephone and Telegraph Company, Leo Brandenberger of the Telluride Power Company, B. W. Mendenhall of the Utah Light and Railway Company; E. H. Eardley, of E. H. Eardley and Brother; R. S. Folland, manager of the Capital Electric Company.

Mr. Armstrong, president of the Commercial Club, invited the new organization to make its headquarters with the Commercial Club. This invitation was unanimously accepted. The luncheon meetings will be held every Thursday noon at 12:15 in the Commercial Club building.

H. T. Plumb, engineer of the General Electric Company, was elected chairman for December; H. F. Holland, of the Simplex Heating Company, chairman for January; and Bruce Cramer, chairman for February. These gentlemen constitute a program committee in charge of the weekly meetings.

Meeting of Transformer Committee.

The subcommittee on transformers of the Electrical Committee of the National Fire Protection Association will meet in Pittsburgh, Pa., on December 16. The object of this meeting is to consider Rule 81c of the National Electrical Code, which rule pertains to the requirements for testing transformers. The committee consists of Victor H. Tousley, chairman, Chicago; Dana Pierce, Underwriters' Laboratories, New York; William McConahey, Westinghouse Electric & Manufacturing Company, Pittsburgh; F. A. Barron, General Electric Company, Schenectady; and G. E. Bruen, New York Board of Fire Underwriters, New York. The meeting will be open to all, and will be held at the Fort Pitt Hotel.

Chicago Electric Club Meeting.

At the meeting of the Electric Club of Chicago on December 5, W. S. Kilmer, illuminating engineer with the H. W. Johns-Manville Company, gave an illustrated talk on "Some New Phases of Modern Electric Lighting." Mr. Kilmer confined his remarks to hospital lighting, describing and showing illustrations of special lighting devices developed to meet the peculiar and severe conditions encountered in hospital service. In the course of his remarks Mr. Kilmer stated that there are three general departments of a hospital where special conditions make the use of specially designed lighting fixtures necessary. These departments are: Operating room, where high intensity is necessary; laboratory, where emergency investigations make the use of special lighting essential, and wards, where a soft but efficient light must be provided.

At the conclusion of Mr. Kilmer's address, Sam. A. Hobson, late of St. Louis, spoke briefly of the St. Louis League of Electrical Interests, of which he is president. Weekly meetings similar to those of the Chicago Club are held and in addition four dinners are given each year. Mr. Hobson stated that the success of the St. Louis organization is due to the Entertainment Committee's activities.

St. Louis League of Electrical Interests Affiliates With Jovian Order.

At the regular meeting of the St. Louis League of Electrical Interests on December 3, the members voted to affiliate with the Jovian Order. There will be two classes of membership in the League, one known as the "League Members," the other class known as "Jovian Members." The League Members will have all the rights and benefits they now enjoy, including the right to vote and hold office and every other right enjoyed by the Jovian Members, except that of attending purely Jovian affairs, such as the initiation ceremony, etc. F. J. Beardslee will be in charge of Jovian affairs. The name of the organization will be changed to "St. Louis League of Electrical Interests—Jovian Chapter."

Fred B. Adam was elected president to fill the vacancy caused by the resignation of Sam A. Hobson.

Annual Meeting of Consulting Engineers.

The annual meeting of the American Institute of Consulting Engineers will be held at the Engineers' Club, 32 West Fortieth Street, New York City, on January 14, 1913, at 8 p. m. Reports of the Council and of special committees will be presented at this meeting and three new members of the Council will be elected.

Electrification of Melbourne Railways.

A report has been prepared dealing with the electrification of the suburban railways of Melbourne, Australia. This project has been under consideration for some years, as the conditions are favorable to electrification. The number of passengers carried per annum has reached approximately 90,000,000. Schedule speed including stops is 21 miles per hour, and about 150 miles of double track are in operation.

Complete specifications for alternative schemes using direct current at 1,500 volts and single-phase current at 11,000 volts were prepared by Merz and McLellan, consulting electrical engineers, and bids were invited and received from all the leading manufacturers of the world, who prepared detailed proposals accompanied by stringent guarantees.

The report which has been presented deals with (1) the choice of system for the suburban lines; (2) the choice as affected by the long-distance lines operated in the country outside of the suburban zone; and (3) the cost of converting the suburban lines of the system recommended, and the financial results to be expected.

On the basis of the lowest bids in each case, the cost of converting the suburban lines on the direct-current and single-phase schemes amounts to $11,430,000 and $14,850,000, respectively. These figures exclude items of expenditure which would be the same with both systems as, for instance, the boiler plant, repair shops, building for power house, etc. The operating costs for the single-phase system would be $343,000 per annum greater than for direct current. It is, consequently, expected that direct current will be used.

Regarding which system would prove the least costly when electric traction came to be adopted on long-distance lines, it was found that the initial cost would be about $63,000 more for single-phase than for the direct-current system, and that the cost of operation would be slightly greater. Some of these country lines extend as far as 100 miles from Melbourne.

Power will be supplied in the form of three-phase alternating current at 25 cycles per second and 20,000 volts, and will be transmitted partly underground and partly overhead to 12 substations at various points on the system, where it will be stepped down and converted to direct current at 1,500 volts. Overhead wires will be used for supply of current to the trains. Train units will consist of one motor car and one trailer, the length of train varying from 2 to 6 cars. The scheme includes provision for 500 motor cars each carrying four motors.

A. B. Field.

The constant developments in refinement of design of dynamo-electric machinery, particularly that involving alternating currents, call for education and experience, not to mention genius, of an exceptional order in the production of competent and efficient designing. The increase in the size and the severe demands upon alternating-current units, particularly in railway work and steel-mills, heavy-shop and similar industrial applications, has engaged the attention of few men so successfully as the subject of this sketch, Allan Bertram Field.

Mr. Field was born at Barnet, near London, in 1875. He received his early education at Highgate Grammar School, London, and his technical education at Finsbury College, later on continuing his scientific training at St. Johns College, Cambridge.

Immediately after leaving school Mr. Field engaged in service as a machinist and fitter, becoming thoroughly acquainted with the practical work of the shop. Later on he joined the engineering staff of the British Thomson-Houston Company, where he took an active part in the preliminary work of some of the London tube railways and other power work of that character. Shortly after Mr. Field was transferred to the American works of the General Electric Company at Schenectady, engaging in testing work and transformer design.

It was in 1904 that Mr. Field turned his engineering talent toward the study of the design of alternating-current equipment and becoming acquainted with B. A. Behrend, at that time chief engineer of the Bullock Electrical Manufacturing Company and chief engineer of the Allis-Chalmers Company, he soon became interested in a number of problems relating to the design of alternators, synchronous motors, induction motors, and similar apparatus. He became chief assistant on alternating-current work to Mr. Behrend, and held this post until the close of 1908, their professional association continuing to the present date. It was at this time that the design of large alternators for direct coupling to gas engines took an important place in the industrial world, and Mr. Field was an active participant with Mr. Behrend in the development of some of the most important designs and applications that have ever been instituted in this field.

In 1909 Mr. Field became connected with the Westinghouse Electric & Manufacturing Company, and he has since been associated with its engineering department, engaging in electrical and mechanical designing work, principally in connection with machines of large capacity, in which he has done much original work.

Mr. Field has contributed a great deal from his wide knowledge to the engineering press and to the proceedings of the national engineering and scientific societies. He is the author of an investigation of the eddy-current losses occurring in deep conductors carrying alternating current, and for his communication entitled "The Dissymmetry of a Three-Phase System," dealing with some features of two-phase to three-phase transformers, he was awarded a premium by the British Institution of Electrical Engineers in 1905.

Mr. Field is a member of many engineering and scientific societies, including the American Institute of Electrical Engineers and the British Institution of Electrical Engineers. He received the degree of M. A. from the University of Cambridge (Mathematical Tripos), and the Honorary B. Sc. degree from the University of London.

Allan B. Field,
Designer of Electrical Machinery.

Co-Operative Electrical Development.

The Organization Committee, which was appointed at Association Island on September 3, for the purpose of suggesting ways and means for the organization of a co-operative movement to carry out co-operative work for the benefit of the electrical industry at large, held its fourth meeting in the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, on December 2. The committee reports that a great deal of progress has been made in the development of a practical plan, but that the subjects to be taken up and the variety of interest to be considered to successfully carry out such an organization, still necessitate a great deal of work on the part of the committee before its suggestions for the contemplated organization will be in shape, concrete enough to present to the industry at large.

Definite by-laws and plans for the operation of The Society for Electrical Development are still being considered, but in the belief that a co-operative organization must be *truly* co-operative, in order to reach the highest point of efficiency, it was decided that before any active work was commenced, there is still a great deal of work to be done.

A sub-committee was appointed on Finance and Administration to carry out further plans in connection with the organization work of the Society, and a sufficient amount was advanced by the members of the Organization Committee to carry on the work.

The next meeting will be held some time during the month of January, and at that time it is hoped that it will be possible to lay before the industry at large a concrete plan which will assure satisfactory results to the industry and to which the individuals of the industry will give their co-operative support.

Electrification of Boston & Maine.

The New York, New Haven & Hartford Railroad Company has filed a notice with the Massachusetts Secretary of State, asking legislative authority to electrify the Boston & Maine Railroad between Boston and Beverly.

Chicago Section of Electric Vehicle Association.

The regular monthly meeting of the Chicago Section of the Electric Vehicle Association of America was held at the rooms of the Traffic Club at noon, Tuesday, December 10. George H. Jones, chairman, presided. A report from the committee on transportation and traffic was presented by Ernest Lunn, Commonwealth Edison Company. This committee is of the opinion that careful study of the proposed changes in the ordinances for the downtown district of Chicago should be made and that conferences should be held with the heads of department stores, express companies, the police department and all others interested in the matter of street traffic. This should include also the various city associations, such as the Automobile Trade Association, the American Association of Automobile Manufacturers, the National Association of Automobile Manufacturers, and others of a similar character.

The matter of the proposed ordinance which would restrict the standing time of an automobile in a city street to one hour, and the suggestions with regard to the consequent parking of automobiles in the city of Chicago brought out considerable discussion.

Mr. Witherbee, of the General Vehicle Company, raised the question as to the disadvantage that would be borne by either the pleasure vehicle or the commercial vehicle should the conditions imposed by the new city ordinance tend to favor either type.

On the subject of garages Mr. Barker, of the Royal Garage Company, said that the garage men had in a measure been simply guessing at their costs. There was a great difference in the expense involved in handling different types of vehicles both of the pleasure and commercial variety, and particularly with electric vehicles, the garage man was very much at sea as to his costs and the charges he should make. He was of the opinion that there should be a separate charge for the storage of the vehicle, including the cleaning, polishing, oiling and minor repairs, and another charge for the electric current. Garages are charging anywhere from $35 a month to $25 a month for taking care of electric vehicles, including all time spent on these machines. The customer, however, was often under the impression that he was simply paying for electric current.

In discussing the matter of securing proper information for the garage men with regard to rates to be charged for the handling of electric vehicles, Mr. Witherbee related the experience of a prominent city which had established a flat charge of $10 for the storage of trucks, another charge of $10 for washing, cleaning, oiling and slight repairs, and in the case of pleasure vehicles a charge of $5 per month for delivery to and from the customer's residence. Current was charged for on a straight kilowatt-hour basis of six cents for the first 300 kilowatt-hours, and four cents per kilowatt-hour for current thereafter. Everybody working under these circumstances appeared to be well satisfied, and with one truck that was under careful observation making over 28 to 46 miles per day over a considerable period, the entire charge, including costs of charging the storage batteries, was $38 as a minimum and $41.60 as a maximum per month.

It was suggested that the Electric Vehicle Association hold a joint meeting with the Garage Owners' Association, and a committee consisting of Messrs. McDowell, Peterson, Wagner and Higginbotham was appointed to confer with the executive committee of the Garage Owners' Association and arrange for a joint meeting.

It was decided to hold the regular monthly meetings hereafter at the rooms of the Traffic Club on the eighteenth floor of the La Salle Hotel, 10 North La Salle Street.

Boston Motor Car Club.

The Electric Motor Car Club of Boston met at the City Club for its dinner and meeting on Thursday evening, December 5. About forty members were present, with President Day Baker at the head of the table. D. C. Tiffany reported for the Committee on Parking Privileges that the authorities had granted certain streets, notably along the Common and Public Garden, where automobiles may remain one hour. The city ordinance limits unattended cars to ten minutes in other places.

Albert Weatherby, of the Anderson Electric Car Company, suggested a co-operative garage, to be located in the down-town district, to accommodate electric automobiles for shoppers and others. Mr. Tiffany thought a capital of $10,000, shared by say ten dealers, would sustain such an enterprise. The existence of such facilities, such as are now provided for patrons by Marshall Field and Company, in Chicago, would be a great inducement to buy an electric. Messrs. Tiffany and Weatherby were chosen a committee to take up the subject further and report at a future meeting.

President M. B. Church, of the Couple-Gear Freight Wheel Company, described various features of fire apparatus in use by the city of Springfield, Mass., and President Baker commented on the widespread introduction of the company's product, particularly in connection with fire departments.

F. M. Kimball, recently elected head of the New England Section of the Electric Vehicle Association of America, said he was impressed with the stability and growth of the electric truck business in all parts of the country. He urged the presentation of concise figures and facts showing the economies and uses of electric trucks, and advocated the employment of advertising experts by dealers co-operatively in arranging a campaign of education.

E. S. Mansfield offered the suggestion of an alliance of the club with like organizations in other cities.

Secretary H. F. Thomson told of the work thus far prosecuted by himself and other members of the faculty of the Massachusetts Institute of Technology, in securing data on the relative costs and efficiency of service, of electric, gasoline, and horse-drawn commercial vehicles. All large users of trucks east of St. Louis are being interviewed. A total of 100,000 observations have been made thus far, and the collection of data will continue until late spring. A chart has been prepared by Mr. Thomson and his associates. Estimates of total expense—(care, drivers, depreciation, repairs, charging, etc., including electricity at three cents per kilowatt-hour, or gasoline at 16 cents per gallon, and basing feed cost at $190 per annum per horse), showed the mile expense for a 1,000-pound parcel-delivery service to be 23 cents for electric, 25 cents for horse, and 27.5 cents for gasoline. For 4,000-pound trucks of the furniture-delivery type, the expense shown is 30 cents for electric, 35 for horse, and 36.5 for gasoline. With the 7,000-pound truck; electric, 37 cents; gasoline, 44.5 cents; and horses, 45.5 cents per mile. For 10,000-pound coal-delivery service, the showing is even less advantageous for the horse, the figures being: electric, 45 cents; gasoline, 50.5 cents; and horse, 59.5 cents per mile. The full results of the investigation will be published later. President Baker called the club's attention to the fact that in New York City there are now 1,612 electric trucks, as against 1,824 gasoline trucks.

Mr. Miller advocated the agitation to motorize fire departments of cities. He claimed that the country's fire loss could thereby be reduced $500,000 per day. Underwriters, he said, will grant reduced rates in cities thus equipped.

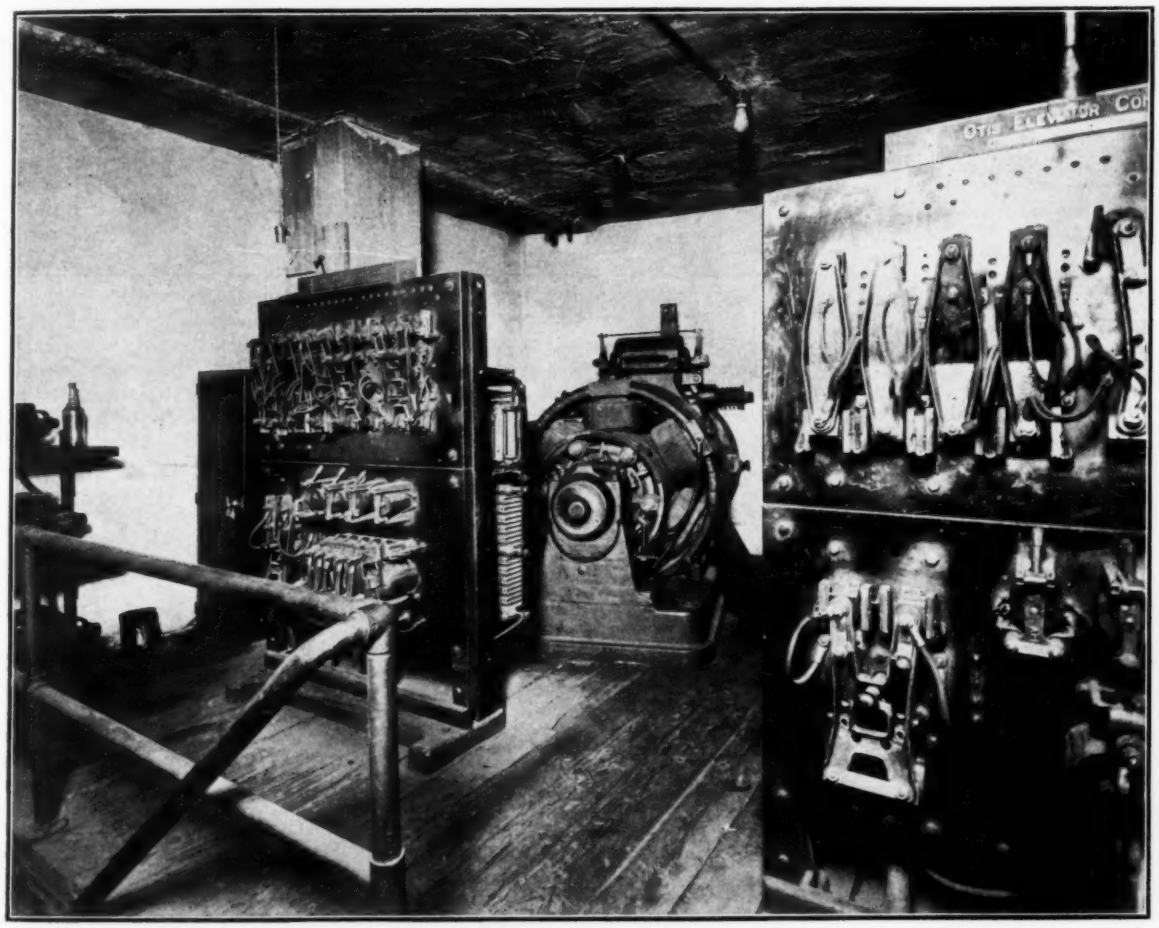
Mr. Stidham, of the New England Motor List, suggested that the club issue a series of brochures, for distribution throughout the country, setting forth facts relating to electric-vehicle efficiency.

Electricity in Hotel Service—I.

The subject of electricity in hotel service will be discussed in three parts. This article deals with power applications and gives information as to the conditions to be met in applying motors to hotel service. Hotel lighting will be treated in a separate article as will electric heating, cooking and miscellaneous applications. A summary of data will be given in the third article.

In discussing the application of electricity in hotel service three natural divisions suggest themselves, namely: (1) power applications; (2) lighting; and (3) miscellaneous, including electric heating and cooking. Each of these three general subjects will be treated in separate articles, a summary of all data being given in the third.

Until recently hotel managers have felt that, on account of the large quantities of steam and heat necessary, a private power plant could supply all heating and power requirements at a figure that would not admit of central-station competition, but more recently, however, results obtained in numerous instances have demonstrated that this condition does not universally obtain. Central stations in widely separated parts of the country are supplying energy to hotels, both large and small, with results that indicate a more extensive use of purchased power in this field in the future.



Electric Elevator Installation in Hotel Sherman, Chicago.

While it is not always feasible to furnish a hotel with all the power used, every hotel offers opportunities for central stations to supply emergency and excess power. This practice is profitable to the supply company and in addtion has frequently served to demonstrate to the hotel manager the better regulation and absolute dependability of central-station service, points which often times are more to be desired than lower power bills. Another method of securing business from hotels which is extremely profitable to both hotel and electric company is to supply energy during the summer season only when there is no occasion to operate the heating system. This also has resulted in the complete shutdown of the hotel plant, as it gives the hotel manager an excellent opportunity to compile comparative costs and to observe the superiority of central-station service. In still other instances the business has been secured, where the hotel operates a private generating plant, by the central station taking over the hotel plant and operating the steam generating equipment during the heating season, supplying all energy from the central station.

While it would be interesting to present comparative cost data on installations where central-station service has completely superseded a private plant, such figures would be of little value unless all conditions were known. Each case must be treated specifically

giving consideration to such items as rental of floor space occupied by generating equipment in the particular location in question; duration of heating season, cost of coal, labor, etc., all of which vary with the location.

One of the strongest arguments that can be advanced by the central-station salesman in soliciting hotel business is to name the more prominent establishments purchasing power. In this connection the accompanying list of imposing hotels, all of which are purchasing power, will indicate what gratifying progress is being made by central-station companies in supplying energy for hotel service.

Prominent Hotels Purchasing Power.

Hotel.	City.
Touraine	Boston, Mass.
Genesee	Buffalo, N. Y.
Powers	Rochester, N. Y.
Kernans	Baltimore, Md.
New Willard	Washington, D. C.
Raleigh	Washington, D. C.
Colonial	Cleveland, O.
Staetler	Cleveland, O.
Anderson	Pittsburgh, Pa.
Henry Watterson	Louisville, Ky.
Gault House	Louisville, Ky.
Pfister	Milwaukee, Wis.
West	Indianapolis, Ind.
St. Paul	St. Paul, Minn.
Pontchartrain	Detroit, Mich.
Densmore	Kansas City, Mo.
Jefferson	St. Louis, Mo.
Maryland	St. Louis, Mo.
Marquette	St. Louis, Mo.
Sherman	Chicago, Ill.
Albany	Denver, Colo.
Grand	Cincinnati, O.
Washington	Seattle, Wash.
St. Francis	San Francisco, Cal.
Ritz-Carlton	Philadelphia.

In Chicago, in addition to the Hotel Sherman, the Commonwealth Edison Company is supplying energy to 44 hotels. Of this number the following are a few of the larger and more prominent ones: Palmer House, Wellington, Briggs House, Union, New Southern, Saratoga, Bismarck and Metropole.

As regards electricity, the Hotel Sherman is one of the most completely equipped hotels in the United States. A brief description, therefore, of the applications of electric power in the operation of this hostelry will give a good idea of the conditions which the central-station engineer has to contend with. For the mechanical operation of the vast amount of equipment installed in this hotel—such as refrigerating plant, ventilating fans, laundry machines, pumps, elevators, etc., electric power has been employed exclusively and this installation is indicative of the present importance of electricity as a potent factor in hotel operation.

All energy for power and light is supplied by the Commonwealth Edison Company, the hotel signing the regular wholesale power contract which provides a primary charge per month of $3.20 per kilowatt of the consumer's maximum demand in such month up to and including 20 kilowatts; $2.50 per kilowatt of the excess of the consumer's maximum demand in such month over 20 and up to and including 50 kilowatts; $2.20 per kilowatt of the excess of the consumer's maximum demand in such month over 50 kilowatts. The secondary charges per month are: six cents per kilowatt-hour for the consumption in such month up to and including 2,000 kilowatt-hours; three cents per kilowatt-hour for the excess consumption, in such month, over 2,000 and up to and including 5,000 kilowatt-hours and 1.4 cents per kilowatt-hour for the excess consumption in such month, over 5,000 kilowatt-hours.

Motor-Driven Ventilating Fan.

The motor load aggregates 660 horsepower and the lighting load about 880 kilowatts. The monthly kilowatt-hour consumption for one year is as follows: December, 119,150; January, 123,440; February, 128,550; March, 110,700; April, 110,620; May, 112,270; June, 116,430; July, 101,580; August, 105,840; September, 116,060; October, 113,620; November, 124,140.

The hotel building fronts 160 feet on Randolph Street, 180 feet on Clark Street, is 15 stories high and contains 757 guest rooms, each having a floor area of 352 square feet.

Main Switchboard, Hotel Sherman.

The power plant apparatus of the Hotel Sherman is divided between two sub-basements underneath the main basement. In

the lower basement are located the boilers, boiler-feed pumps, auxiliary pumps and part of the ventilating equipment. There are three 400-horsepower Stirling water-tube boilers equipped with Green chain-grate stokers, the latter operated by a three-horsepower motor. The boilers operate under a working pressure of 150 pounds.

Coal may either be brought to the building in wagons and dumped in receiving hoppers from the alley, or in cars of the Illinois Tunnel Company. Coal brought into the building in tunnel cars is dumped into receiving hoppers and then elevated, by means of a 7.5-horsepower-motor-driven elevator to the coal-storage bins over the boilers. By means of a traveling dischargher, coal may be delivered into these bunkers at any desired point. Bunkers have a storage capacity of 100 tons.

Ashes are dumped from the grates into a motor-driven conveyor which conveys them to a concrete ash bin located adjacent to the coal bunkers. From this bin the ashes fall by gravity into tunnel cars.

The heating apparatus in the Hotel Sherman consists mainly of a direct system with auxiliary fan blasts for heating and ventilating the main lobby, reception rooms, dining rooms and other public rooms. All guest rooms are heated by direct radiation alone. The total direct system is operated as a Dunham vacuum system.

The total direct radiation aggregates 31,000 square feet and together with the blast coils, containing a total 12,000 feet, is installed to utilize exhaust steam from all pumps and live steam direct from the three boilers. The pressure of 150 pounds is reduced by a pressure-reducing valve located on the main leading from the high-pressure header to the expansion tank.

The low-pressure system proper begins at the connection on the high-pressure header that leads to the expansion tank. From the expansion tank all low-pressure heating lines emanate. As a safety precaution, one 16-inch relief line with back-pressure valve and cut-out valve in same, extends to the roof.

The main heating lines for the direct radiation comprise a one-tenth-inch main running direct to the attic where it circles the same and branches to supply risers beneath, and a one-fourth-inch main, located in the basement, to heat all direct radiation on the first floor.

The return system of piping is analogous to the supply system, there being an independent system for each main supply. The return risers are run as near as possible to the supply risers and connections to radiators are carried behind or below the radiator.

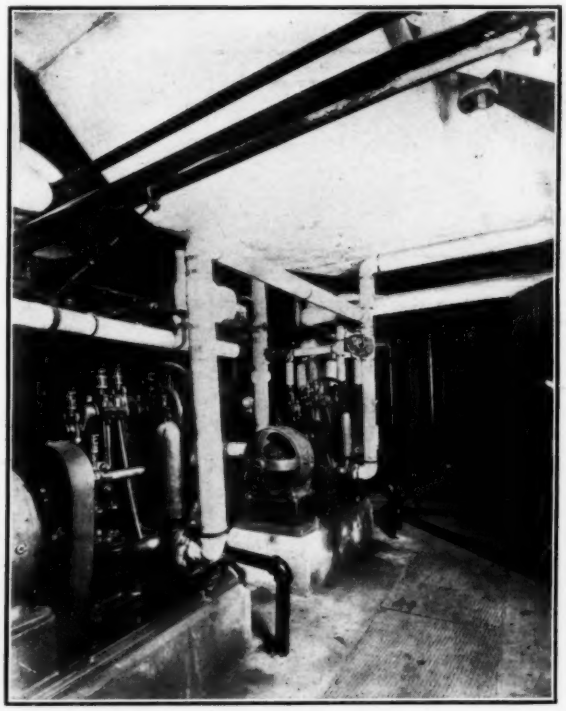
The ventilating system of the hotel is complete in every detail and represents the latest practice. The general system is divided in several sub-divisions, each of which forms a complete unit. For ventilating the basements and the "College Inn" restaurant there are provided, in the lower basements, three blast fans driven by 15-horsepower motors. In the first basement are three additional fans for furnishing fresh air to the banquet hall and on the first floor are three fans for supplying the kitchen and private dining rooms. All fans are operated by shunt-wound semi-inclosed 220-volt motors of 35 and 15-horsepower size, depending upon the size of the fan, in some instances belt connected and in others direct-connected to the fan. There are two fresh-air intakes which convey the fresh air to the basement, where it is passed through Niagara air washers and thence conveyed through ducts to tempering coils and to the fans.

Foul air from all public and guest rooms is conveyed through ducts to the attic where there are installed a number of exhaust fans which remove the foul air from the building.

The refrigerating plant in the Hotel Sherman is of the absorption type and has a capacity of 75 tons. The plant actually manufactures 10 tons of ice per day. The plant comprises a generator of the shell and coil type; a vertical analyzer; one dehydrator of the submerged type; separator; ammonia condensers; ammonia receiver; brine cooler; freezing tanks; and pumps. The pumps comprise two duplex 8 by 10 by 12-inch steam-driven brine pumps, two simplex double-acting 14 by 8 by 12-inch ammonia pumps capable of handling aqua ammonia of any strength, and two motor-driven 4 by 6-inch drinking-water pumps for circulating ice water to the various rooms. In connection with the refrigerating plant there is provided a number of ice crushing and shaving machines, driven by motor.

The elevator installation comprises seven electric elevators, four passenger,

Sump Pumps Driven by Direct-Connected Motors.



Ice-Water Pumps in Hotel Sherman.

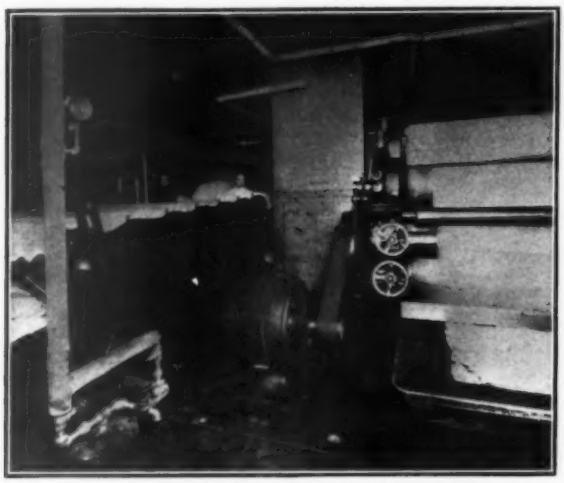
two freight and one lift running from the basement to the ground floor. The elevators are all electric type using worm-gear traction machines overhead. The elevators are all provided with car-switch control and all modern signals which will be described in a later issue.

Two dumb-waiters, each operated by a 7.5-horsepower motor, extend from the first floor to the top floor. The motors are placed above the shaft. The operation of these dumb-waiters is under the control of a dispatcher in the kitchen. An elaborate signal system is installed which will be referred to later.

Another use of motors in the Hotel Sherman is made in the laundry. This department embodies in its equipment and its arrangement and method of installation the most advanced ideas. The equipment consists of two 15-horsepower motors, running at a speed of 600 revolutions per minute, each belted to a line shaft driving four No. 11 washers, one 28-inch curb extractor, and one 20-inch starch extractor; one 5-horsepower motor belted to a line shaft driving one shirt ironer, one body ironer, one sleeve ironer and one collar ironer; one 0.5-horsepower motor belted direct to one collar dampener; one one-eighth-horsepower motor belted direct to one starcher; one one-horsepower motor direct-connected to one extractor; one one-sixth-horsepower motor direct-connected to one cuff starcher; one one-horsepower motor belted to dry-room; one one-horsepower motor direct-connected to flat-work ironer; one 3-horsepower motor belted to Trojan mangle; one one-horsepower motor belted to towel dryer and one one-horsepower motor belted to blower. The laundry is said to have a capacity of 30,000 pieces per day.

In addition to the foregoing uses of motors electric power is used in the printing department where all menu cards and stationery is printed and in the various kitchens and pantries for operating bakery machines, dish washers, vegetable parers, egg beaters, bottle washers, coffee grinders, ice-cream freezers, etc. A complete list of motors in this hotel will be given in the data sheets to appear in the third article on this subject.

In the foregoing discussion the application of electric power was treated as it applied specifically to a modern hotel. The following general information supplements that already presented and covers the usual conditions found in hotel service. As is well known the majority of power used in hotels is for ventilation, pumps, refrigeration, elevator service and vacuum cleaning. The superiority of motor drive for these services is too well known to need repetition.



Motor Driving Mangle in Hotel Sherman Laundry.

Group of Laundry Machines Driven by 5-Horsepower Motor.

Elevators.

The electric elevator is coming more into use for passenger and freight service. It is in every way superior to the old mechanical drive and its cost and operating expense are less than the corresponding cost for hydraulic installations, this being especially true in small plants. The electric machine is more efficient, takes less space, is less complicated and requires less attendance than the hydraulic type. The usual type of electric elevator is the drum machine on which the hoisting and counterweight cables

Table I.

ELECTRIC ELEVATOR PERMORMANCE

No. Elevators	Avg. Rise in feet	Type of Machine	Type of Control	Load in Pounds	Speed feet per Minute	Car-Miles per Day per Elevator	Kilowatt-hours per Car-mile	Under or over Balance	Remarks
10	303	Vertical Sprague-Pratt	Pilot motor	2500	400	13.4	3.35	U-	6 day test at load 591 pounds.
5	189	Sprague-Pratt	Pilot motor	2500	400	13.4	3.35	U-	7 hour test at load 225 pounds.
6	165	Sprague-Pratt	Pilot motor	2500	450	—	4.30	U-	
2	213	Drum	Ward Leonard	2000	400	21.7	4.20	O-	1 month run in service
4	235	2 Duplex 2 Drum	Fraser Magnet	2000 2000	500 350	18.	5.76	O-	9.5 hour run in service
3	140	Drum	Magnet	2000	400	15.2	3.58	O-639	7 day test in regular service
3	132	Drum	Magnet	2000	350	11.25	3.08	O-800	6 day test in regular service
3	184	Drum	Magnet	2500	400	10.9	4.35	O-620	8 day test in regular service
1	110	Drum	Magnet	2500	250	13.96	3.82	O-	7 day test in regular service
2	127	Drum	A B See	2000	200	3.7	2.20	O-140	
1	113	Drum	Magnet	1500	275	6.3	2.12	O-400	
1	73' 3"	Sprague	—	2000	275	4.3	6.668	—	
1	127	Traction	Magnet	3000	500	15.4	4.97	O-125 5	15 day test, service conditions, local car
1	258' 10"	Traction	Magnet	3000	500	26.8	4.11	O-112 0	12 day test, service conditions, express car
1	215	Traction (geared)	Magnet	3000	—	29.	4.525	—	16 day test, service conditions
1	154' 7"	Traction	Magnet	3000	—	20.	5.03	—	16 day test, service conditions
3	190	Drum	A B See	—	395	15.	5.62	—	1 month test, service conditions
4	125	Drum	—	2680	260	10.	4.0	—	2 month test, service conditions
8	132	Electric-Hydraulic	—	2800	300	—	6.7	U	—
4	134	Electric-Hydraulic	—	2000	600	—	5.1	U	—

are wound upon a drum usually driven by worm gear. The traction elevator is now coming into quite general use where high lifts and high speeds are necessary. This consists of a cable drive in its simplest form, with driving sheave directly connected to the armature shaft of a motor of very low speed. The cables pass under the driving sheave, thence over an idle sheave and again under the driving sheave, and are attached at one end to the car and at the other to the counterweight. The two half wraps on the driving sheave will usually give all the adhesion necessary for ordinary elevator service. This can be increased for heavier duty by increasing the number of wraps of the cables. The speed of the car is equal to the circumferential speed of the driving pulley.

The Fraser or duplex elevator consisting of two motors continuously operating an endless cable, the movement of the car being obtained by varying the speed motors, has been used, but not generally.

The electric elevator is easily equipped with safety devices such as automatic stops, which operate when all doors are not closed or when the car passes a given point. The push-button elevator requires no regular operator. The passenger operates the car by pushing a button corresponding to the floor desired; the car goes to that floor and stops of its own accord, and when the door is closed, it proceeds to answer the next push-button call, stopping automatically at the floor from which the call originated. The accompanying Table I shows representative performances of electric elevators.

TABLE III

CAPACITY, SPEED AND HORSEPOWER OF DISK VENTILATING FANS

(American Blower Co.)

Air Velocity in Feet per Minute	Size Fan		Inches 18	21	24	30	36	42	48	54	60	72	84	96	108	120
	Free	Cu. ft. p. min.	1060	1440	1880	2940	4230	5772	7536	9540	11770	16960	23090	30156	38160	47160
		Rev. per min.	327	280	245	196	165	140	122	110	98	82	70	62	55	50
600		Hp.	0.016	0.022	0.028	0.048	0.064	0.087	0.113	0.143	0.177	0.253	0.345	0.450	0.573	0.706
	Heater	Rev. per min.	530	453	396	317	267	227	197	178	158	132	113	100	89	81
		Hp.	0.053	0.072	0.094	0.147	0.212	0.288	0.377	0.477	0.590	0.849	1.15	1.51	1.91	2.35
	Free	Cu. ft. p. min.	1235	1680	2200	3400	4940	6730	8800	11120	13750	19760	26950	35016	44500	55000
		Rev. per min.	370	328	280	230	190	164	145	127	112	96	82	72	62	58
700		Hp.	0.025	0.035	0.045	0.070	0.110	0.136	0.178	0.227	0.279	0.402	0.548	0.740	0.905	1.11
	Heater	Rev. per min.	600	530	458	372	307	266	234	206	178	158	132	116	100	92
		Hp.	0.071	0.096	0.126	0.196	0.283	0.384	0.503	0.636	0.786	1.13	1.54	2.10	2.52	3.14
	Free	Cu. ft. p. min.	1410	1920	2510	3820	5650	7700	10300	12710	15710	22600	30400	40150	50900	62800
		Rev. per min.	435	373	326	262	218	187	164	145	131	110	94	83	73	66
800		Hp.	0.036	0.048	0.068	0.098	0.142	0.192	0.251	0.317	0.392	0.562	0.766	1.00	1.27	1.57
	Heater	Rev. per min.	705	604	527	424	353	302	265	234	212	178	152	134	118	107
		Hp.	0.106	0.149	0.189	0.194	0.426	.579	0.756	0.957	.811	1.71	2.32	3.20	3.83	4.73
	Free	Cu. ft. p. min.	1584	2160	2826	4410	6354	8650	11304	14310	17667	25443	34642	45234	57250	70650
		Rev. per min.	490	425	368	285	246	210	184	164	146	123	106	93	82	74
900		Hp.	0.048	0.065	0.085	0.132	0.190	0.258	0.338	0.428	0.530	0.762	1.04	1.35	1.72	2.12
	Heater	Rev. per min.	792	770	595	461	398	340	298	265	236	199	173	150	132	119
		Hp.	0.143	0.195	0.254	0.397	0.572	0.780	1.02	1.29	1.59	2.29	3.12	4.07	5.15	6.36
	Free	Cu. ft. p. min.	1770	2400	3140	4900	7060	9610	12560	15900	19630	28270	38480	50265	63600	78540
		Rev.. per min.	545	470	406	328	275	234	205	181	166	136	120	103	91	82
1000		Hp.	0.057	0.080	0.104	0.142	0.233	0.317	0.413	0.520	0.647	0.933	1.27	1.66	2.09	2.56
	Heater	Rev. per min.	883	760	657	530	445	378	332	293	268	220	194	167	147	132
		Hp.	0.204	0.276	0.362	0.565	0.814	1.11	1.45	1.83	2.26	3.26	4.44	5.77	7.33	90.5
	Free	Cu. ft. p. min.	2112	2880	3768	5880	8472	11541	15072	19100	23566	33900	46176	60312	76300	94240
		Rev. per min.	654	560	490	398	330	280	245	218	196	164	140	124	110	99
1200		Hp.	0.101	0.138	0.180	0.280	0.405	0.550	0.716	0.910	1.13	1.62	2.20	2.87	3.63	4.48
	Heater	Rev. per min.	1059	912	788	636	534	453	396	351	322	264	234	200	176	160
		Hp.	0.300	0.409	0.534	0.832	1.20	1.64	2.14	2.70	3.37	4.85	6.60	8.63	10.8	13.3
	Free	Cu. ft. p. min.	2475	3360	4400	6850	9870	13470	17600	22270	27500	39600	53900	70300	88950	109500
		Rev. per min.	767	655	570	460	388	327	286	254	230	190	164	144	128	115
1400		Hp.	0.133	0.180	0.235	0.368	0.530	0.721	0.942	1.19	1.55	2.12	2.89	3.77	4.77	5.89
	Heater	Rev. per min.	1235	1064	919	742	623	528	463	410	376	308	274	234	205	184
		Hp.	0.487	0.660	0.864	1.35	1.95	2.64	3.46	4.38	5.40	7.88	10.6	13.8	17.5	21.6
	Free	Cu. ft. p. min.	2830	3850	5000	7810	11300	15400	20050	25400	31400	45200	61500	80000	101200	125200
		Rev. per min.	875	750	656	526	438	375	332	298	264	220	188	165	146	131
1600		Hp.	0.185	0.252	0.330	0.515	0.742	1.01	1.34	1.67	2.06	2.97	4.05	5.28	6.68	8.25
	Heater	Rev. per min.	1412	1216	1050	848	712	603	537	468	429	352	314	268	234	210
		Hp.	0.735	1.00	1.31	2.04	2.94	4.00	5.23	6.62	8.17	11.8	16.0	20.9	26.5	32.7
	Free	Cu. ft. p. min.	3170	4320	5630	8850	12700	17300	22600	28600	35200	51000	69000	90200	114000	141000
		Rev. per min.	980	840	732	590	490	420	368	330	294	245	210	185	163	148
1800		Hp.	0.247	0.336	0.440	0.686	0.991	1.35	1.76	2.22	2.75	3.97	5.39	7.04	8.90	11.0
	Heater	Rev. per min.	1588	1368	1181	954	801	679	595	526	483	396	354	302	263	236
		Hp.	1.05	1.43	1.87	2.93	4.23	5.75	7.50	9.50	11.7	16.9	23.0	30.0	38.0	47.0
	Free	Cu. ft. p. min.	3520	4800	6280	9800	14120	19240	25120	31800	39260	56510	76960	100520	127200	157100
		Rev. per min.	1090	935	815	655	545	470	410	363	327	272	234	206	182	164
2000		Hp.	0.336	0.456	0.597	0.931	1.34	1.83	2.39	3.02	3.73	5.38	7.31	9.55	12.1	14.9
	Heater	Rev. per min.	1764	1520	1312	1060	890	755	664	586	528	440	380	336	292	262
		Hp.	1.30	1.77	2.30	3.60	5.15	7.05	9.25	117.	14.5	20.8	38.3	37.0	46.8	57.8
	Free	Cu. ft. p. min.	3890	4300	6800	10800	15520	21130	27600	35000	43200	62200	84700	110500	139800	172500
		Rev. per min.	1200	1050	900	720	600	515	450	400	360	300	257	228	202	175
2200		Hp.	0.424	0.576	0.754	1.18	1.70	2.31	3.02	3.82	4.72	6.79	9.25	12.1	15.3	18.8
	Heater	Rev. per min.	1940	1700	1460	1163	971	830	727	645	582	485	415	368	323	284
		Hp.	1.70	2.30	3.00	4.70	6.80	9.25	12.1	15.3	18.8	27.0	37.0	48.2	61.0	82.0

Refrigeration.

Refrigerating machines in large part use ammonia in the production of low temperatures. The ammonia is drawn into a compression chamber, and compressed to a pressure of approximately 150 pounds per square inch. The compressed gas then passes into a condensing chamber containing a series of pipes or coils over which cold water flows. Under the combined influence of the pressure produced by the compressor and the cooling influence of the water, the gas becomes liquefied. The liquid ammonia then passes into a receiver, where it is stored. From this receiver when the machine is in operation, the liquid ammonia passes to the expansion coils and there expands to a gaseous form, absorbing large quantities of heat, and performing the actual work of refrigeration. The amount of heat so absorbed or taken up is equal to the amount that was previously given up to the water during the condensation of the ammonia from a gaseous to a liquid form.

Another form of machine frequently used and in more favor with some hotels, is the carbonic anhydride machine using carbon dioxide. This machine has two special advantages at least: the absence of the smell of ammonia, and the fact that in case of fire in the refrigerating room, a safety valve opens at a slight increase of temperature, and fills the room with the gas which drives out the oxygen and stops combustion without injury to

the contents of the refrigerating room.

The horsepowers given in table II are based on condensing water of a temperature of 70 degrees Fahrenheit. When condensing water of a higher temperature is used, the consumption of power will increase accordingly.

TABLE II.
CAPACITIES OF ICE MACHINES AND HORSEPOWER REQUIRED.

Refrigerating capacity in tons per 24 hours	Ice-making capacity in tons per 24 hours	Horsepower required
0.5	0.25	1
1	0.5	2
2	1	4
3	1.5	6
5	2.5	9
8	4	13
10	5	15
12	6	17
16	8	22
20	10	26
25	12.5	32
30	15	37.5
35	17.5	43
40	20	48
50	25	60

Ventilation.

To procure fresh air and to keep it in circulation is a problem of particular interest to hotels. In summer, especially, and in inland and low sections of the country, arrangements for good ventilations become a matter of business necessity to render a building habitable during the hot months, and in the winter it is an equally important matter where a large number of people congregate, as in audience rooms, banquet halls, etc.

For good ventilation it is not only necessary to draw in pure air, but to remove the vitiated air, and to continue this process indefinitely. A ventilating fan of the propeller type is usually fixed in a circular aperture in the wall and can be arranged as desired—either to draw in fresh air or expel bad. An exhaust fan should be placed so that it discharges the air in the same direction as the prevailing wind, in order to avoid having to contend with wind pressure. The number and location of air inlets and probable effects of prevailing air currents should also be considered carefully in determining the place for the fan. Under ideal conditions the room to be ventilated should have only one inlet for air which should be at the opposite end of the room from the exhaust fan. The size of the fan to be installed, of course, depends largely upon local conditions, but roughly speaking, the 18-inch size will be found sufficient to provide fresh air for 25 or 30 persons. This allows for the provision of 2,000 cubic feet of air per hour for each occupant of the room.

Table III. gives the cubic feet of air per minute which can be handled by fans of various sizes running at certain speeds and requiring a given horsepower, both for operation in free air and in connection with a heater.

In addition to the power applications discussed motors are used in printing departments, laundries, for pumping and minor service in hotels. Data on these subjects have been given in articles treating of printing, laundries, pumping, etc., published in preceeding issues. In two subsequent issues hotel lighting and elctric heating, cooking and miscellaneous applications as applied to hotel will be treated.

Commercial Practice
Management, Rates, New Business

Central-Station Affairs in Victoria, B. C.

That the West is endeavoring to "keep its end up" in the matter of developing new business is clearly shown from the records of the growth of the British Columbia Electric Railway Company, Ltd., of British Columbia, Canada. With a population of about 60,000, the Company has at the present time slightly under 10,000 lighting meters in service, and 98 per cent of the total residences are on its system. New connections are being made at an average rate of from 180 to 200 per month. In addition to the lighting business, electric cooking is finding much favor among consumers, and at the present time some 300 installations are in operation, giving entire satisfaction.

The Company has a special rate of five cents per kilowatt-hour for this class of business, with a monthly minimum of 75 cents per kilowatt connected; at this rate there has been no complaint, and this end of the business is steadily increasing, the average during the past six months being three per week. One installation which has proved to be of more than ordinary advertising worth was a complete electrical installation in one of the local schools, in the Household Science Department. Parents of the girls have an opportunity to visit the classes at any time to note progress made, and the electrical equipment has invariably come in for special attention.

Flat-iron campaigns are annually carried out in the summer months, although the sales of these appliances are steady all the year round—very few residence consumers are now without this handy appliance.

Victoria offers a splendid opportunity for the electric vehicle, there being some 70 miles of asphalted streets with no bad grades. The central station is not overlooking this branch of the business, and the town runabouts, as well as the heavy truck, are steadily on the increase.

Street lighting in Victoria has undergone a very considerable change during the past year, and consists either of magnetite arc or ornamental post lighting. The latter system has found much favor, and there are about 2,000 standards on the down-town streets. The style of post adopted is of cast iron with five lights, the distance between posts being 80 feet, and the method of location four at intersections, and the remainder opposite. The lamps used are 50-watt tungsten, with 12-inch frosted globes. All the lamps burn till midnight, and alternate posts all night. The installation is paid for by the property owners benefited, and the current is supplied by the company and paid for by the city on a kilowatt-hour basis.

While Victoria is regarded as a residential city, the power business is one of no inconsiderable size, and extends from the smallest motor to several installations which take from 2,000 to 3,000 horsepower each (the latter in cement plants) with a load-factor of 85 per cent.

Sign and store-window lighting has been given special attention by the central station, who keep in very close touch with the architects and contractors, to see that correct illuminating engineering is carried out. The company adopted the system of free low-voltage sign lamps with free renewals about a year ago, and this has resulted in a great increase in the number of signs, and the experiment has proved to be entirely satisfactory to the company as well as to the customer.

Electric signs are making their appearance in Guatemala City, and there are numerous opportunities for further extending them, but it is stated to be necessary for an agent to be in the field to properly exploit the business.

Power Exhibit of Denver Company.

As a means of stimulating interest in electric drive, the Denver Gas and Electric Light Company recently held a power or electric show on the main floor of its salesrooms. The show was in progress for two weeks and proved to be an educational medium of exceptional value. Every day and evening during the two weeks of the show the salesrooms of the company were filled to capacity and there is little doubt but that the industries of Denver were given a very good lesson on the use of the electric motor for driving machinery of all kinds.

Denver Central-Station Power Exhibit.

The company secured the co-operation of the manufacturers and machinery supply houses and this in a measure was responsible for the success of the undertaking, as practically every electrical manufacturer in Denver, the larger ones of the country and almost all of the machinery supply houses installed various kinds of equipment which were shown in actual operation. More than 50 different appliances were displayed, ranging from the utility motor for household use, to the larger motors for driving refrigerating machinery and pumps.

Section of Exhibit Showing Methods of Irrigation by Electric Pumps.

Besides the company's power engineer, F. D. Burr, who had charge of the exhibition, a large corps of the company's salesmen, and the salesmen of the agencies exhibiting, were in attendance to take care of the crowds and give any information desired by the visitors. Special letters were sent to all the business men who could use the appliances which were shown and certain days in the first week of the show were set aside so that special attention could be given each of the different classes of business men. In addition to this advertising the newspapers were used in order to attract the public in general.

It is doubtful whether any great returns will be secured, or even expected, from this electric power demonstration at the present time, but it is certain that this show has accomplished in an educational way what no other advertising could do in such a short period of time. As in everything else it is a hard matter to convince any man by "word of mouth advertising" that any certain equipment will do more and better work than that which he has in service. At least the process of education is longer. Seeing is believing and when a person sees an actual demonstration of this kind it is bound to make a deep impression.

The Denver company has been endeavoring for some time to interest farmers in the suburbs around the city in the electric pump for irrigating their farms. A good deal of progress has been made and several installations have been put in, but there is still a large field to be covered, and to show the farmer how the electric motor in conjunction with the pump may be effectually used on the farm, a working model was exhibited at the show. The same is true of every other line of business. The saloons, markets, packers and other business establishments having use for electric refrigeration plant were shown the superiority of this equipment over the ice system by actual demonstration at the show.

Several of Denver's large manufacturing establishments also lent a hand in making the electric show a success. In the Fifteenth Street windows a garment manufacturer installed electrically driven sewing machines, and trousers and shirts were made at the rate of about 100 per day. Another firm manufactured shoes, turning out in the neighborhood of 175 pairs a day. Both these displays told their story effectually and if there were any business men in the city in those particular lines of business who did not know about electrically driven equipment they are well aware of the fact now.

The Denver company has had such remarkable success with demonstrations of this kind that plans are being formulated at the present time for the production of an illuminating show in the near future. In holding these shows it is the policy of the company to pick weeks in which a discount day falls so that the largest number of people possible may see the demonstrations. During the discount period which generally lasts about three days —that is, the heaviest travel in the company's office occurs on the two days prior to discount day and on discount day, refreshments are served to the public and every effort is made to come as closely in contact with the customer as possible.

Every little detail that will in any way tend to popularize electricity and electrical appliances is carefully handled. During the electric show moving-picture machines were demonstrated, in connection with the rectifier, to the motion picture men, but the company was also careful to show pictures that would interest the housewife in electrical appliances, and matinees were given every afternoon and exhibitions were also held in the evening. At these times the Northern Colorado Power Company's moving picture on irrigation was exhibited and the Westinghouse company's film "The Education of Mr. and Mrs. Thrifty."

In another window on the Fifteenth Street side of the Gas and Electric Building the company made a very complete display of the small utility motor and a woman sewing on a machine showed the advantages of propelling the sewing machine with the aid of electric power. A complete line of rectifiers for charging electric automobiles was also demonstrated in an effort to interest the owners of pleasure cars in private charging stations. The hotel men were shown the electric potato peeler, exhaust fans, deep-well pumps and other appliances, while the printers were interested in displays of electrically driven printing presses. In another section of the show machinery for assaying shops was demonstrated. A miniature farm plat was arranged to interest the farmer in the deep-well pump and the pump for irrigation purposes.

Employees' Benefits at St. Louis.

The management of the Union Electric Light & Power Company, of St. Louis, has announced that hereafter a mutual benefit fund which has been created will be used to pay sick, accident and death benefits to employees or their families. The general plan is similar to that inaugurated by other public-service companies with the addition of a loan feature providing for the borrowing of money by employees.

Novel Plan for Reducing Smoke.

A successful plan for increasing the interest of firemen at its power station in reducing the volume of smoke given off by its stacks has been adopted by the Louisville Lighting Company, of which G. Wilbur Hubley is chief engineer.

A prize is given each month to the fireman who shows the best record in the production of carbon dioxide, which is another way of saying the smallest amount of smoke. The prize usually is $5, and has been the means of developing a friendly rivalry among the firemen and consequently in keeping up the amount of CO_2 given off by the plant.

Inasmuch as automatic registers are attached to the boilers indicating the extent of carbon dioxide which is being produced, the firemen has it constantly in his power to regulate the situation, and the prospect of winning a prize is a sufficient incentive to justify the belief that the registers are watched closely by the men in the boiler-room.

There has been considerable municipal agitation against excessive smoke production in Louisville, and while it is realized by Mr. Hubley and other executives that decreasing the amount of smoke does not necessarily prove that an economy has been effected, it is an improvement in the situation which is very desirable from the standpoint of public policy.

Elaborate Toy Display in Central-Station Window.

One of the most complete and unique electric toy displays exhibited in Louisville, Ky., in years is embodied in the window display which is attracting the attention of thousands of persons daily at the handsome office building of the Kentucky Electric Company, in that city. Under the direction of President Robert E. Hughes and his assistant, C. C. Ousley, a complete toy railway system, or rather two of them, has been installed and is in operation from the time that the building opens in the morning until it closes at night. The system is much more elaborate than those which have been featured for years by toy shops and department stores, inasmuch as miniature city blocks have been fitted up, with a complete ornamental street lighting system, and the observer finds himself watching the cars as they thread about numerous corners and disappear under several under-passes, instead of merely dashing aimlessly about a circular track. The feature is proving to be effective advertising for the big electric toy department which the Kentucky Electric Company has instituted for the holidays.

Motor Truck Efficiency and Economy.

An efficiency and economy test was recently made with a two-ton electric truck in the service of the Schwabacher Brothers Company, wholesale grocers in Denver, Col. After a six months' trial it was found that the motor truck did not only increase the efficiency of the service, but effected a saving. For the six months the expenses averaged $150 a month; this included driver's wages, garage expenses, oil, tire replacements and all other incidentals. During this period the truck carried 975 tons of goods, the total cost of delivering per ton was 93 cents, and the average price for team deliveries was charged by the transfer company for making deliveries for the wholesale grocers in the same territory covered by this particular truck is from $1 to $2 per ton. This would give the truck credit for an average saving of 57 cents per ton, making the total saving for the six months' service $556.

Another Large Contract at Minneapolis.

The Minneapolis General Electric Company has closed a ten year contract for selling electric current covering the requirements of the Northern Power Company, which operates under 25-year franchises in the villages of Excelsior, Deephaven, Tonka Bay, Wayzata and a number of other communities on the shores of Lake Minnetonka near Minneapolis. To serve this desirable business including at present a population of about 12,000 in summer and 5,000 during winter, a nine-mile continuation of the transmission line now being extended to Hopkins, Minnesota, will be necessary. The Northern Power Company is rapidly extending its lines to all of the summer resorts around the lake. The company will close down its steam generating station at Excelsior, 18 miles from Minneapolis. Many small isolated lighting plants will be displaced by electricity, as well as gasoline plants heretofore used for pumping water.

Philadelphia Street-Lighting Contract.

The Philadelphia Electric Company has been awarded the contract for street lighting in Philadelphia. The contract covers 10,938 lamps upon overhead wires at 23.5 cents a night; 742 lamps upon underground wires belonging to the city at 23 cents per night; 2,741 lamps on cables in conduit at 28 cents per night; making a total of 14,421 lamps, which is a larger number than is at present found in any other city of the United States.

Electrical Construction

ELECTRIC WIRING IN ZINC SMELTERS.

By H. G. Wilson.

The number of electricians who have to install or repair electric circuits in plants of the kind mentioned in the heading of this article does not appear to be large when compared with the number of men engaged in electrical construction of other kinds; but the conditions encountered here are sufficiently similar to those existing in certain other classes of industrial plants to make a consideration of electric wiring in zinc smelters of interest to electricians generally. Owing to the physical discomfort, caused by heat and sulphur fumes, to the men who have to do with the installation and upkeep of wiring in the calcining kiln rooms of zinc smelters, the best method of construction to be adopted is generally considered from the standpoint of human endurance first, and questions of maintenance are taken into account afterward.

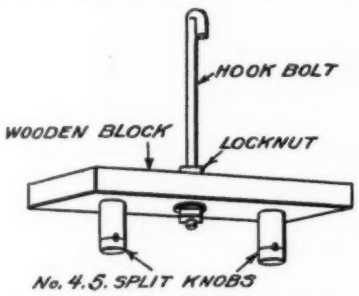


Fig. 1.—Supporting Block for Circuit.

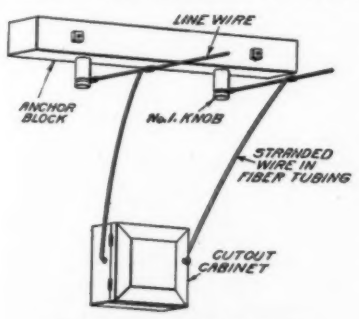


Fig. 2.—View of End of Circuit.

In plants which the writer has recently inspected, there was a conspicuous absence of conduit construction. The reasons for this are not far to seek. In the first place, where work has to be put in after the plant is already in operation the circuits must be of a type which can be installed very quickly; workmen could not live long enough in the fumes of a calcining kiln to install standard conduit work there or to make any considerable repairs on work already installed, these fumes being especially bad in the upper portion of the room where the circuits usually have to be placed. And then again, since it is not always certain that the supply of oil or natural gas depended upon for fuel will not soon prove to be so limited as to make it advisable to discontinue the operation of the plant, the owner is rather naturally inclined towards the adoption of wiring less expensive to install than conduit work.

Thus it happens that, as a rule, open wiring is employed. Some of this is good, and some of it indifferent. Some of it is designed for the convenient complete removal of the circuit whenever such removal may become desirable or necessary. It is the purpose of the following notes to describe the construction of circuits arranged to be taken down and replaced readily wherever repairs are needed. Moreover, this construction is of a kind such that in the installation of the circuits most of the work can be done by workmen on the floor of the room and thus out of the way of the worst part of the fumes.

It may be well to explain in passing, that, due to the peculiar construction of the buildings, the fire hazard of defective open wiring is not usually so great in the sort of plant under consideration as in plants of other types. The building materials used are not of an inflammable character; and the wires are supported from iron trusses. How they are supported will appear from a consideration of the accompanying illustrations, these being sketches of the construction in a calcining-kiln room of a large zinc-smelter plant.

Running transversely across the room from one rafter to another there are steel tie rods, and on these the circuits are hung by means of supports like that shown in Fig. 1. Blocks of wood two-by-six inches in cross-section and seven inches long are used, and into these No. 4.5 split knobs for attaching the wires are screwed. Through the center of each one of these blocks an iron rod with a hook on one end of it and threads on the other is passed. A locknut fits snugly against the block on one side, and between this and another nut on the end of the rod the knob-supporting block is secured, proper washers being used with both nuts. The short rods, or hook bolts, as they are called in Fig. 1, are long enough to allow the wooden blocks to hang about six inches below the transverse tie rods when a circuit has been put in place.

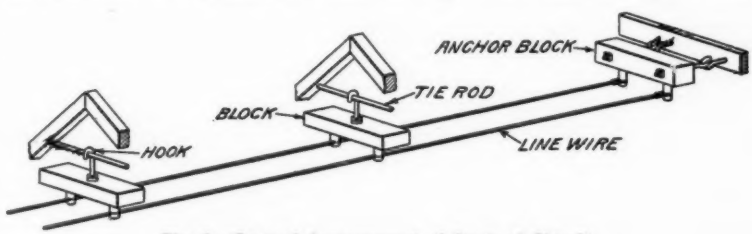


Fig. 3.—General Arrangement of Parts of Circuit.

For holding the conductors taut, other wooden blocks like that shown in Figs. 2 and 3 are provided at the ends of a circuit. The cross-section of one of these blocks should preferably be four-by-four inches and its length eight inches. Through each end of this anchor block an eye-bolt is inserted as shown in Fig. 5, which figure shows the block in position, with the observer looking down on the circuit from above. To the under side of the block the knobs for the wires are attached, No. 1 solid knobs being employed here. The eye-bolts should have extra long threads, so as to provide adequately for taking up slack in the wires. The anchor blocks may be fastened to anything that is convenient; in the building which the

writer has in mind they were fastened as shown in Fig. 5. A two-by-six-inch timber was bolted to vertical I-beams which happened to be a part of the building structure, and from this support was secured by the use of hook bolts.

Fig. 2 is another view of the anchor block at the end of a circuit and the wiring from it to the cutout cabinet.

In putting up work of the kind under consideration, the circuit wires are attached to the split knobs in the blocks shown in Fig. 1 and drops are attached wherever they are wanted; and then a tool like that illustrated in Fig. 4 is used to hang the blocks to the roof tie rods.

As has been mentioned already, No. 1 solid knobs are used on the terminal anchor blocks. Around these the

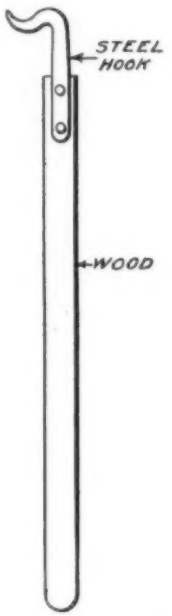


Fig. 4.—Tool for Putting Blocks in Place.

wires are double-looped and the ends soldered and taped at the return. At the end of a circuit nearest a feed enough stranded wire is soldered to the circuit wires to reach the circuit connection in the cutout cabinet. It is good practice in soldering these feed taps on to wrap a few turns of the insulated stranded wire around the circuit wire ahead of the place where the insulation is removed from the latter. Wrapping the wire in this manner ahead of the joint obviously tends to protect the soldered part of the joint from being broken by vibration or swinging of the circuit.

As has been pointed out in the foregoing, wiring of the kind described is readily installed from the floor, where the sulphur smoke is least troublesome. This is what might well be classed as good electrical construction, too; but its chief recommendation is that a whole circuit may be removed within a few minutes whenever it needs repairs. Fig. 3 is a view of a portion of a completed circuit.

Effective Electrical Inspection.

While the necessity of thorough, systematic inspection of electric wiring is generally recognized, there are widely varying opinions as to what constitutes proper inspection and how this can best be secured. Writing in the *Southern Electrician*, W. J. Canada, president of the Western Association of Electrical Inspectors, contends that some wiring contractors will be found, who, on some buildings will, without inspection, produce permanently safe wiring. Competition, however, will soon make wiring frail and dangerous; the more so, as the purchaser is unable of his own knowledge to discriminate as he can with most forms of construction. Fires, continued troubles with lights, or the criticisms of fire hazard by insurance raters, ultimately create a partial demand for an inspection which will obviate these troubles.

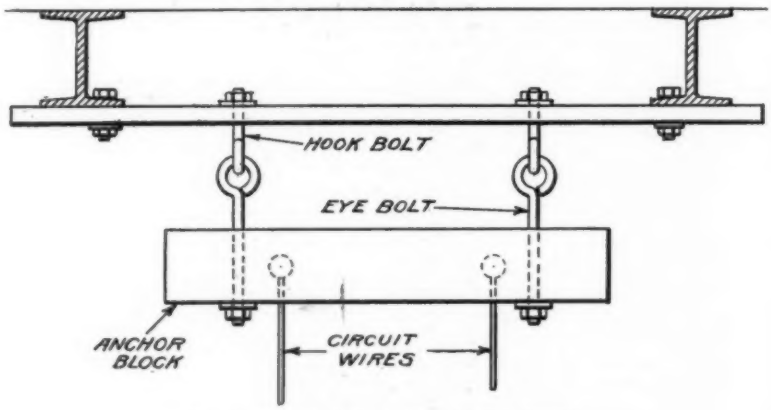


Fig. 5.—Method of Supporting Anchor Blocks.

A standard is now available, but has no legal status. The insurance engineer advises and criticises, but his statements have no legal effect, and installations may still vary as the owner or workman decides. By specification much can be done, but the changes and additions can be covered only by recurring inspections, which owner or management may or may not demand. A legal standard must be developed, it must be made unlawful for other than licensed and bonded wiremen to interfere with wiring, and a legal inspection must be arranged. Supply stocks must be pruned of defective wire and fittings. Finally inspection and enforcement must be removed from adverse political influences as far as possible, and the competency of the inspector insured by disinterested support.

This whole process is the peculiar field of the underwriters, whose interest is solely for safety and permanence. The standard may be secured by passage of ordinances, and ultimately by statute, including the requirements of the National Electrical Code, with such additions as the best practice indicates, among them the extension of conduit wiring over continually broader limits, the use of cabinets for cutouts in all cases, and the abolishment of certain more objectionable classes of construction. Rules for motor fusing may be made more definite, and the discretionary powers of the inspector confined to interpretation rather than extended to individual rulings.

The licensing of contractors and wiremen should become a part of ordinance or statute. The supervision of detail in inspection, grade of results, etc., should be made by underwriters periodically at least. An arrangement for such aid and supervision is easily made with any municipality in these days of publicity, as the specializing on fire prevention should evidently give the fullest competency to underwriters' engineers, and the absence of local bias in the underwriters' inspection will tend to recommend its utilization by even the purely political inspection department as evidence of its impartial enforcement of restrictions. Stocks may be made and kept free from objectionable materials by united action by municipal and underwriters' inspectors. Contractors may be licensed after examinations conducted by both interests jointly.

All the results outlined above follow naturally a comprehensive and forcible presentation of the subject to the law enforcers—the citizens. The most effective method is for the underwriters' engineer to arrange a meeting with the commercial body, give a consecutive argument to them, answer questions, produce figures, and impart the impression of mutual interest in permanently safe construction. This body,

after due discussion, since it usually supports any measure calculated to benefit the community, will in most cases recommend prompt action to the council.

It is ordinarily best to present a tentative ordinance to the city council, with the endorsement of the commercial association. A committee to consider the subject can then be advised on the most vital features of requirement, and the detail of form, penalty, choice of inspector, method of licensing, etc., left to the city attorney, who will accommodate them to the uniform procedure of the city. The matter by this time will have become of vital interest to the public mind, and the enforcement of requirements will be given active support instead of suspicious and reluctant support, in most instances, by both the property owners and by the tenants.

In a certain field covering several states, the pursuit of such a campaign has lately resulted in the adoption of twenty-one electrical ordinances, including two requiring all conduit in fire limits, the use of grounded secondaries in thirty-nine cities, the adoption of four gasolene lighting ordinances.

For this purpose twenty-seven complete city electrical reports were made, twenty-two commercial organizations and nineteen city councils addressed. Forty-three rough drafts of electrical ordinances were presented to city attorneys.

Along with such work must be handled the individual electrical inspections of buildings, which are the basis of the entire matter by developing the fire hazards in existing installations, and the frailty of all but standard forms of material and construction. Upon the proper balance between these duties depends the greater or less success of the underwriters' engineer in the reduction of fire hazard and the advance toward wiring installations of equal permanency with other portions of building construction of the most modern type.

CONDUIT WIRING IN REINFORCED-CONCRETE BUILDINGS.

By Ben R. Browne.

In many concrete buildings, particularly in those which are to be used as factories, it is not practicable to locate definitely the outlets for lamps nor those for motors until the tenant has moved in or until the machinery has been set in place. Moreover, to make a good, neat job of conduit wiring in a completed concrete building where suitable provision for the circuits were not made during its erection, is a difficult piece of work, and one which may involve large expenditures in labor and extra material.

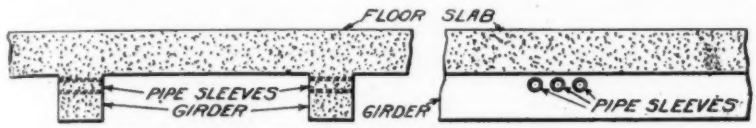


Fig. 1.—Sections Showing Location of Sleeves for Conduits.

If the floors are of the one-slab variety of finish, it is the best plan to place pieces of pipe in the girder forms during the construction of the building, through which the conduits can be run when the electric wiring is undertaken. These pieces should be of the proper size to slip over the conduits easily. Short lengths of steam pipe having an internal diameter of an inch and a quarter are, for most cases, the best thing to use, and in parts of the building where the number of circuits is expected to be large, there should be two or three pipes in each group. They are installed as indicated in Fig. 1. The pipes pass horizontally through the girder, near the ceiling line in every bay, and may be placed on all four sides of the bay so that several circuits can be wired in it.

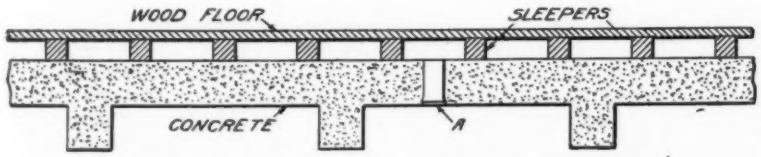


Fig. 2.—Construction Where Floor is Placed on Top of Concrete.

The pieces of pipe should all be of such a length that when the forms into which the concrete was poured are taken down the ends of the sleeves will be flush with the sides of the finished girder. Then, by using condulets and exposed iron panel boxes, a neat job of exposed-conduit work is assured. Compared with the cost of installing conduits on hangers held in place with expansion bolts, the construction is economical, too.

Care must be taken that the alinement of the sleeves is exact, and that they are fastened in the forms so that the cement workers will not disturb them during the filling of these forms with concrete.

Another type of concrete building is one in which the slabs are usually four inches thick. Here, as in the case of office buildings, two or three-inch sleepers are laid on the concrete and a finished wooden floor laid on these. Such buildings usually require gas as well as electricity, and hence combination fixtures or chandeliers may have to be installed. As a rule, gas companies will not connect to gas pipes in the slabs. Hence provisions must be made for bringing the pipes through the slab, for construction engineers object to laborers weakening a floor by chipping out reinforcing iron where this crosses the point at which the outlet must come. The piping is done after the forms are removed, but, in order to save drilling, holes must be made before this. A good method to follow is that illustrated in Fig. 2.

A tin tube or sleeve (*A* in Fig. 2) of the kind generally placed around steam pipes where they pass through ceilings, is made use of. This tube ought not to be smaller than three inches in diameter, and six inches is a suitable length for it. It is flared out at the lower end and nailed to the bottom of the form where the outlet is required. The tubes may then be filled with sand, so as to keep them from being filled with concrete.

In running the piping thereafter, the electrician should use four-inch outlet boxes, half an inch high, and without the outlet cover, leaving the center knockout hole for the gas pipe. The conduits should be bent with short ells, so that the pipes will lie in the two or three-inch space between the finished floor and the concrete slab.

It is understood that the feeds to these installations are carried exposed; or, as in the case of tile or concrete partitions or walls, in the usual channels made for them.

Of course, modifications may have to be made to comply with conditions that always vary according to the wishes of the architects and engineers; but the kind of construction recommended above is employed extensively in one of the largest cities of the country and has always been approved.

Speaking of the dangers, during the approaching Christmas season, of fires from defective temporary electric wiring, *Insurance Engineering* remarks that electricity is at once the safest and the most unsafe method of illumination. Safest when wires, fuses, switches and lights are installed in a standard manner; most unsafe when not installed in a standard manner. Temporary extensions of wiring in show window displays and in the many ways that are usual before Christmas should be looked after with the same care that is taken with the permanent work.

Some Construction Rules of a Large Central Station.

On the lines of any central station, uniformity of practice in methods of making service connections, locating meters, and the like, is always to be desired. It is desirable, too, that the central station keep all electrical contractors doing business in the community supplied with definite information as to what it considers the best practice in such matters. The Commonwealth Edison Company of Chicago, is one of the large central stations that do this, and the following notes are a summary of some of the more important rules of this company.

All electric wiring which is to be connected to the mains of this company must be installed in accordance with the rules and requirements of the electrical inspection department of the city of Chicago, with those of the Chicago Underwriters' Association, and the rules of the company itself. Before the service is connected to the company's mains, inspection must be made by the company's inspectors. A certificate of approval from the city inspector is required also before the current is turned on any new installation. The company requests that it be notified whenever additional apparatus is to be connected to wiring already approved and in service, and in case this request is not complied with and meters or other apparatus is damaged, the party who made the connection is held responsible for the loss.

Lighting installations which exceed the equivalent of twenty-four 50-watt lamps must be wired with three-wire mains from the service entrance to the centers of distribution, and the two-wire branch circuits from these latter points must be kept as nearly balanced as possible. This rule is not held to include single battery-charging outlets, stereopticons, etc., which require more than 1,200 watts.

It is recommended that all mains, whether two-wire or three-wire, be designed to deliver the maximum burning load at the distribution center with a voltage drop not exceeding two per cent.

Services.

In the case of underground services, it is required that the customer's wiring be extended to the company's nearest service and provided with the necessary service switch and cutouts.

If the current is desired in premises where circumstances are such that a separate service is necessary for the premises, application must be made to the company to have a service installed.

In case it is necessary to extend service inside of the property line in order to reach the building, the expense of the installation of the portion inside the property line must be borne by the consumer.

If the district is one where the service has to be supplied from overhead lines, the consumer's wiring must be brought outside the building wall nearest the company's distributing lines at some point at least 25 feet above the ground, so located that it will be readily accessible to service wires brought from the nearest pole. In case the pole line from which service is to be given is not in position at the time interior wiring is being done, inquiry must be made at the inspection department of the company for information as to its proposed location.

Inside wiring is not allowed to be brought out of the building in an inclosed air shaft, as a city ordinance forbids the erection of wires across a roof to reach wires in such a place. Also, a city ordinance prohibits open wiring on building walls.

Individual services are never run for small adjoining buildings under the same ownership.

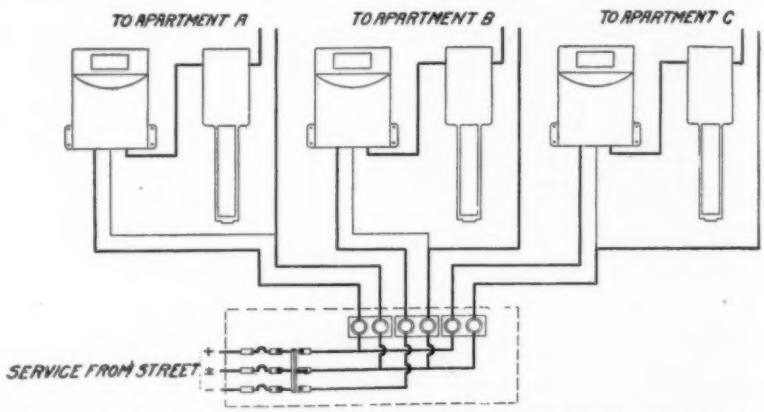


Fig. 1.—Wiring on Meter Board for Apartment House Having One Circuit to Each Apartment.

On the alternating-current system of the company, separate services are provided for motors of one horsepower or larger, for arc lamps where a large installation is made, and for stereopticon arc lamps.

Separate mains and meter loops are required for all wiring fed by separate services.

Sign Regulations.

For the protection of the public, the safety of the workmen who clean and re-lamp electric signs, and to reduce as far as possible the cost of sign maintenance, the following rules are insisted upon:

Signs which are to be cleaned or relamped from a ladder must not be hung higher than 30 feet above the sidewalk. All signs placed at a greater height must be so located and hung that they may be swung in toward the building and reached from windows, and such signs must be so placed that the bottom of the sign will not be below the window sills from which it is to be cleaned, nor the top of it more than six feet above the window sill.

Any sign which must be cleaned or re-lamped from a ladder, and whose top is more than 30 feet above the sidewalk, must be provided with two sets of guy lines having separate attachments on the sign and also on the building. All guy lines, whether they consist of chain or of cable, must be of the hot-galvanized type. Sectional signs provided with two sets of guy lines must have one set of these attached to the bottom of the sign and the other set attached to the top of it. It is required that guy lines be placed at such an angle with the horizontal that the sign will not be raised up and the weight taken off the main supporting chain by strong winds.

Where the sign cannot be conveniently provided with a guy line on each side, it must be held rigid from swinging by means of a stiff rod or strong back connected to the top of the sign.

It is required that expansion bolts be of the lead-wedge type, three-eighths of an inch in diameter and three inches long. They must be firmly set in holes drilled into a masonry wall. In the case of brick walls, if a solid, hard brick cannot be found to set the bolt in, the guy line must be attached to a bolt passing entirely through the wall.

Eye-bolts and hooks which screw into turnbuckles must have a hole drilled through their ends and be provided with a split pin to prevent unscrewing.

Hinge-bolts must be provided with locknuts or split pins.

Swaying signs must be attached to their cranes by hangers passing over iron collars placed on the crane and provided with an aluminum lining. A bearing for these aluminum-lined col-

lars must be placed upon the crane, and must consist of solid aluminum collars with flanges at one end. These aluminum collars must be placed upon the crane with the unflanged ends facing each other, and be rigidly attached to the crane and of such size that the aluminum-lined collars will have a snug fit, but be free enough to permit the sign to oscillate.

Cross plates to which guy lines are attached should be bolted to the sign with two short snug fitting bolts, which should be riveted over after nuts are put on. These bolts should be large enough to support the sign without danger of breaking or shearing, and should not be smaller in diameter than three-eighths of an inch. The plates should be of such a width that the distance between bolts will not be less than one-third the distance between the holes where the guy lines are attached.

Swaying signs supported from a crane must have stranded feed wires between building and sign. Feed wires which are not run through the crane must be attached to insulated support on the crane near its base, and from this support connected to the sign with a drip loop extending three inches below the sign outlet. Wherever feed wires pass through an iron plate or through the side of an iron pipe the opening should be protected by a porcelain-enameled bushing.

The main supporting chains, the guy lines and the attachment to the crane should be made, it is insisted, by means of a large ring or link, which for convenience may be split and the ends lapped. The split ends, however, should be placed downward.

It is required that every electric sign, large or small, have a main supporting chain.

TABLE OF CONDUIT SIZES.

Size of Conductor B. & S. Gauge	Number of Conductors in One Conduit.				
	1	2	3	4	5
	Inches.	Inches.	Inches.	Inches.	Inches.
14 Solid	½	½	¾	1	1
12 "	½	¾	¾	1	1
10 "	½	¾	¾	1	1
8 "	½	¾	1	1	1¼
6 "	½	1	1¼	1¼	1¼
4 Stranded	½	1	1¼	1¼	1½
2 "	¾	1¼	1½	1½	2
1 "	¾	1¼	1½	2	2
0 "	1	1½	2	2	2
00 "	1	1½	2	2	2½
000 "	1	2	2	2	2½
0000 "	1¼	2	2	2½	2½
350,000 "	1½	2	2½	3	
500,000 "	1½	2½	3		
750,000 "	2	3			
	1 Pair	2 Pairs			
14 Duplex	½	½			
12 "	½	¾			

Meters, Cutouts and Service Boards.

It is required that meter loops be provided in the mains at readily accessible points, and that these be arranged so that meters may be mounted with ordinary wood-screws on the wall. There must be provided meter boards of sufficient size to permit the installation of recording wattmeters and maximum-demand meters. On three-wire mains two demand meters are installed, but maximum-demand meters are not placed on installations where the load is less than one kilowatt. The company requests that the placing of meter boards on walls subject to any considerable vibration, or in places subject to much moisture or heat be avoided. A pressure-wire tap must be provided in all cases where the wires of the circuit are not looped out, and on three-wire mains this tap must be made on the neutral wire. It should be possible to install the meter without crossing the wires; but if this is impracticable in any case, enough flexible tubing should be left on the wires to make the installation safe and in accordance with the city inspection rules.

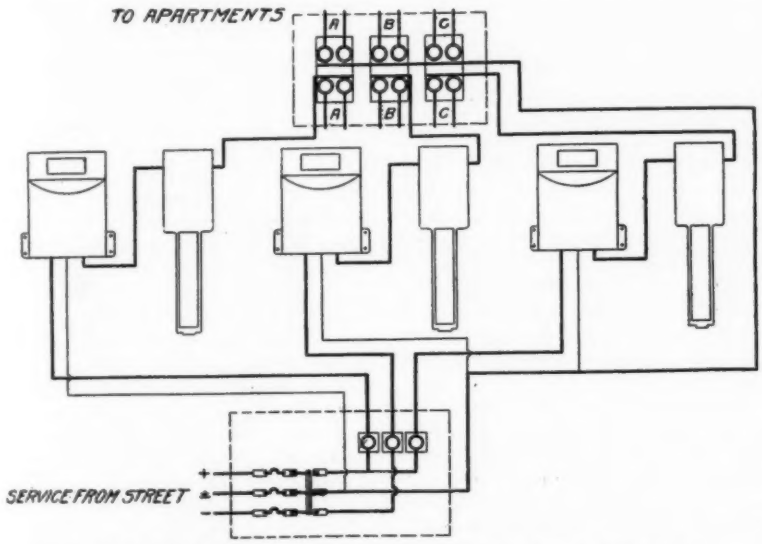


Fig. 2.—Wiring of Meter Board Supplying Two Circuits for Each Apartment.

Meter loops, it is stated, should not be placed more than seven feet from the floor, and they should always be as near the point of entrance of the wires as is possible.

In office buildings meter loops should be located at a central point in meter closets or public corridors, and in apartment buildings in the basement of the building, so that meters may be installed and maintained without annoyance to tenants.

Meter loops for service to supply temporary lighting or power to new buildings during construction must be located on adjoining premises. In such cases, where meter loops cannot be installed on adjoining premises, special arrangements must be made with the contract department of the company. No three-wire meters larger than 200 amperes are used. Installations requiring meters of larger capacity are provided with two meters, one on each side of the three-wire main; space should be allowed accordingly in arranging meter boards.

Figs. 1 and 2 illustrate arrangements of meter boards which the company recommends for apartment houses. Where it is desirable, a combination of these two boards can be employed. In the figures, the larger instruments shown in outline are recording wattmeters and the others are demand meters, of course.

Where a service board is required there should generally be separate panels for light and for power, and a special panel for elevators also, if there are electric elevators in the plant. The board should be provided with removable links for meter testing, and there should be a clearance of three feet between apparatus on the back of it and the wall.

In deciding upon the sizes of leads to be required for induction motors the company is governed by the rules of the bureau of electrical inspection of the city; the minimum sizes of conduits permissible are shown in the above table.

Essential Properties of Conduits.

The report on a series of tests on rigid metallic conduits recently conducted at the Carnegie Institute of Technology contains a summary of the properties desirable in construction material of this character which should prove interesting to electricians not already familiar with what constitutes the best grade of conduits for electric circuits.

It is pointed out that the ideal conduit should occupy the least possible space; it should be rugged and mechanically strong, and yet be easy to install; it should be durable; it should efficiently protect and preserve the insulation of wires contained in it. No single substance of which such conduits might be made possesses all of the above mentioned qualities. Some have certain qualities in suitable degree, but are conspicuously lacking in others, while another substance which possesses all the physical properties needed in the ideal conduit, would be absolutely prohibitive in cost.

In the past, many substances, singly and in combinations, have been made into conduits; for example, fiber, paper, rubber, molded pulps and metal pipes lined with paper, wood or compositions; but all such have been practically abandoned. At the present time standard commercial butt-welded wrought iron or steel pipe is the material employed in the manufacture of rigid metallic conduits. Although there are different types, and numerous makes of such conduits on the market, by common consent and necessity, there is a similarity in certain features. The pipes are all made a uniform lengths of ten feet; they are cleaned to remove scale, and specially treated to make the pipe smooth, both inside and outside; they are then coated with some substance intended to prevent rusting, to give them a pleasing and distinctive appearance and to reduce friction between the inner surface of the conduit and the wires.

While no single substance possesses all the qualities desirable in a conduit, iron pipe possesses most of them, and it is to increase its ability to resist corrosion that the coating mentioned above is applied. The relative values of various types and makes of conduits, therefore, are chiefly determined by the degree with which they resist corrosion, and the general efficiency of their coatings. In order to arrive at correct conclusions regarding the qualities necessary in protective coatings for iron or steel pipes to be used as interior conduits for electric wires and to select suitable laboratory tests to determine the merits of samples of various coated pipes now on the market, careful consideration of the actual conditions which the finished product will encounter in service is necessary. These conditions vary widely.

At its inception, the so-called "interior conduit system" was designed to solve the problems peculiar to concealing electric wires in fire-proofed buildings, for which purpose it is now in almost universal use and has no successful rival. In later years, however, its wider use has given rise to many new problems. Its many advantages with respect to ease of installation, permanency, mechanical protection to the wires, etc., have resulted in the extension of its field to include all classes of buildings, and all classes of electric service. It is not only used in all sorts of buildings, but also out doors, on walls, etc., and underground, either buried in the earth or in tunnels and mines.

Interior conduit, therefore, is liable to attack by almost every conceivable destructive agency. It is exposed to the action of the weather in outdoor situations; it is subject to extremes of heat and cold; it may be buried in the earth or in cement, cinder concrete or lime-sand plasters; it may be exposed to corrosive vapors, coal smoke and gases; it may be attacked by oils, acids, or alkalies, and always it must suffer mechanical injury in transportation, during installation and in service. The number, variety and severity of the destructive forces against which protection for the base metal must be provided, constitute a problem of no mean order, which requires for its solution the exercise of sound judgment and scientific knowledge in the selection of materials and invention of methods for applying the coating, and skill and integrity in manufacture, as well.

There is one point which should not be lost sight of or ignored, namely, the danger from the almost unavoidable penetration of vapors and liquids to the interior of the conduit, there to begin their attack, if they are deleterious in nature. It is obvious that adequate protective coating should be applied at this point as well as on the exterior.

The qualities necessary in an ideal protective coating for rigid interior conduits are: It should resist corrosion effectively; it should not flake or scale off when the pipe is bent; it should resist the spread of corrosion from points where a break in the coating has been accidentally made; it should be as thick as it is practicable to make it and should cover both the inner and the outer surfaces of the tube completely; it should be able to withstand ordinary handling without injury; and it should not suffer from wide variations of temperature.

As coatings for conduits, both zinc and an enamel composed of oils, gums and mineral substances are employed. Zinc coatings may be applied by any one of three different processes. These are hot-galvanizing, by dipping the pipe in a bath of molten zinc; cold-galvanizing, or electro-deposition; and sherardizing, or coating with zinc from zinc dust.

Among the Contractors.

W. F. Tanner & Company, Baltimore, Md., is making a marble switchboard for the Hotel Rennert which is to be of five panels with fuses on the rear.

H. B. Rust Company, of Providence, R. I., is installing complete the electri lighting plant at San Pedro de Macoris San Domingo. The only competition electric lighting has in that place is kerosene at 70 cents a gallon.

The National Electric Company has been awarded the contract for the electrical installation in the city jail at Annapolis, Md. The installation consists of electric light wiring, bells, fire alarms and fixtures.

Doughty & Welch, electrical contractors of Fall River, Mass., are changing over from overhead to underground the electrical construction on the estate of John E. McGowan at Warren Point, Seconnet, R. I. The work includes putting in about 3,800 pounds of the new twin lead and steel underground "Simplex" cables.

The W. S. Rosenfeld Electric Company is about completing the installation on the underground feeder contract for the city of Baltimore, between the high-pressure pumping station, City Hall and other public buildings, for the purpose of supplying electricity to the various buildings from a power house located at the high-pressure pumping station, which is operated by the city. The same company is installing the feeders and 187 ornamental arc lamp posts for the city along Charles Street Avenue and the University Parkway Boulevard.

A. J. Anderson & Company, one of the best known firms of electrical contractors in Louisville, Ky., has closed a number of important contracts recently, including the new box factory of the Mengel Box Company, of Louisville, which is located at Winston-Salem, N. C. This work will include wiring and motor installation throughout the structure, which will be one of the biggest in the Mengel group. The job will cost approximately $6,000. The Cannelton Public Service Company, of Cannelton, Ind., has awarded a contract to Mr. Anderson for equipping its new power plant and water works in Cannelton. The plant develops 400 horsepower and is thoroughly modern in every particular. The contract for installing the power, heating and ventilating equipment in the new $300,000 building of the Young Men's Christian Association in Louisville has also been secured by the Anderson company. This work will cost $35,000.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

A Device Convenient in Wiring Finished Houses.

In wiring an already finished house the electrician sometimes leaves floors and carpets covered with chips and dirt which fall upon them while the ceilings were being cut for outlet boxes. It is very desirable always to avoid this sort of thing as far as possible, and an excellent way to do this is to use a plaster catcher like the one illustrated in Fig. 1. To make this about three yards of cambric or silesia is required. This cloth is sewed together and a hem, approximately an inch wide, is then run along one selvage, through which hem a thin steel wire is inserted so as to form a hoop for holding the bag open at the top. The hoop will be some 30 inches in diameter. In order to complete the bag it is only necessary to tie it at the bottom and to fasten a metal hook to the free ends of three pieces of cord of equal length attached to points in the wire hoop 120 degrees apart.

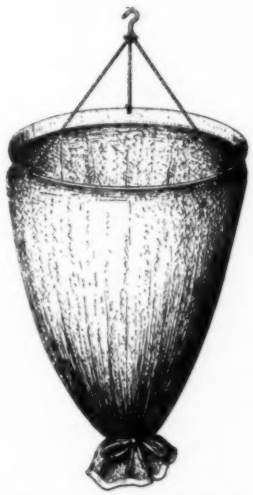


Fig. 1.—Bag as It Appears in Service.

When the bag is in service at combination outlets, it can be suspended by means of the hook from some portion of the gas piping. On straight electric work a small hook can be screwed into the laths to hold the bag.

Joseph T. Vielherth.

Concerning Connections to Primary Side of Transformer.

In connecting to the high-tension side of lighting transformers, I have found the construction shown in Fig. 2 very desirable. The end pins of the top cross-arm I like to leave for the arc-lamp circuit, if there is an arc circuit, and I run the primaries to the transformer on inner pins of the same arm. Wherever possible, it is advisable to mount the primary cutouts on the opposite side of the cross-arm from the transformer. Moreover, I follow the practice of making one primary fuse larger than the other. The smaller fuse is put in first. In case there is trouble in the transformer of a kind to blow the fuses, the smaller fuse will usually blow, and thus the annoyance to the attendant of having a fuse blow in a block in his hand is avoided.

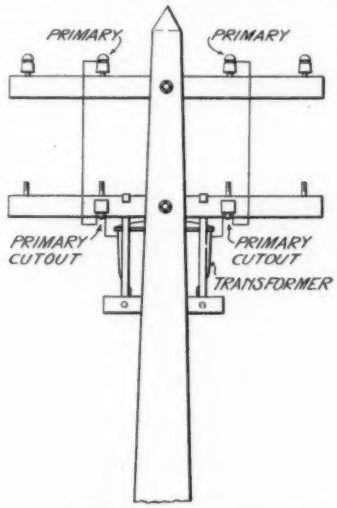


Fig. 2.—Transformer and Cutouts in Position.

Harry H. Matheson.

A Unique Fishing Tape.

Wiremen generally use a flat steel tape in fishing electric conductors in wiring a house for lights or power. However, I have found the "snake," made in the manner described below, much more satisfactory for most kinds of work than the flat tape.

A piece of iron wire—preferably galvanized-iron wire, since this has a smooth surface—about twice the length of the desired snake is looped at its middle around a No. 12 screw, or around a spike of approximately the same size as the screw. The two ends of the wire are then clamped tightly together in the chuck of a brace and the wires twisted around each other closely throughout their length.

When the screw or spike used is removed a loop is left on one end of the snake for attaching wires to be pulled in, and a hook may be bent on the other end if it is wanted.

Correct twisting will take all kinks out of the wire and leave the twisted pair perfectly straight. In fishing small conduits it is well to wipe these wires with oily waste before beginning to use the tool. One particular advantage gained from the use of this tool in certain kinds of work is that it does not coil up so readily as the flat tape.

For tile or fiber duct of large diameter it is well to use a No. 10 wire.

C. C. Sisson.

Testing for Grounds.

Fig. 3 illustrates a scheme which I sometimes employ in looking for grounds on circuits in the territory where I work. It will be noted that this method does not necessitate making a ground at the distribution cabinet. At the power station the busbars *A* and *B* are connected permanently to earth through the station ground-detector lamps, and hence if an accidental ground occurs on side *A*, say, of any circuit fed from these busses, that fact will be made known by the lighting up of the lamp between busbar *B* and the permanent ground. Then in order to find which circuit the accidental ground is on it is only necessary to connect the leads of a portable voltmeter across points like *C* and *E*, or *D* and *G* in the switch cabinet. A deflection of the instrument indicates the existence of a ground.

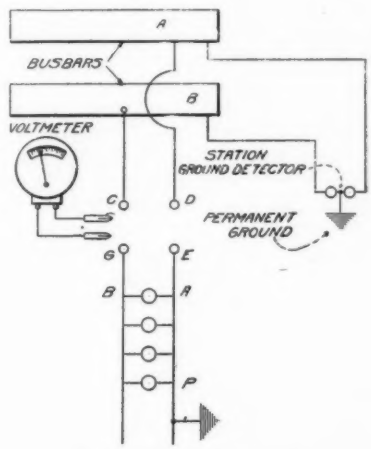


Fig. 3.—Diagram of Circuits.

It often happens that grounds occur on circuits from cutout boxes installed in places where a temporary ground cannot well be made. In such a case, the foregoing method is especially useful.

C. R. Edwards.

Among the Supply Men

Harmony and Co-Operation From the Jobber's Standpoint.

Writing under the title "Harmony and Co-operation from the Jobber's Standpoint," T. H. Bailey Whipple presents in the November issue of *Southwestern Electrician* an interesting discussion of the relations of the jobber and manufacturer, as follows.

Having served both the jobber and the manufacturer for many years, working in a co-operative capacity with the salesman in the field for each class of trade individually, and also having served the jobber in behalf of the manufacturer, I believe I am in a position to sympathize with each and to discern wherein each fails in his conception of what is due the other. At any rate, I have crystallized upon some opinions which I herewith submit for whatever they may be worth.

Co-operation is the moving factor of modern commercialism, the outgrowth of centuries of development, the very keystone of civilization, the main-spring of human evolution, and, apparently, the central idea of creation itself.

The idea or principle of interdependence is universal and pervades all nature.

A corn upon the toe will affect the whole physical and spiritual nature of its victim, and the motion of a gnat's wing will have its influence upon the remotest planet.

Harmony and successful commercial co-operation are co-existent, one and inseparable. Upon the degree of harmony rests the efficiency of co-operation.

With this brief suggestion as a preamble, we will now consider the most essential features of the everyday, practical side of our subject.

Ever since I can recall, and possibly since the very earliest days of organized commercialism, the position and utility of the jobber and even the very destiny of this trade factor, have been questions of ever recurring discussion and of widely varying opinion. It is the writer's opinion that long after the bones of his readers have turned to dust, and when even our monuments have been transformed by the ravages of Time's assimilating and perpetual but slowly progressing change, the jobber will be here, a highly developed, essential and beneficial commercial organism.

Therefore, for the purpose of this paper, let us regard the existence of the jobber as permanent, and his destiny and mission as one of beneficent and practical utility. A condition, not a theory, confronts us.

To the small manufacturer, with no selling organization, or with a most limited sales organization, and especially with the manufacturer of a single or few products only, where the high ratio of cost of production to cost of exploitation is pronounced, the relationship with the jobber is a very simple one and of relatively easy solution. With the large manufacturer, possessed of a large and efficient sales organization, the adjustment of profitable relationship is often very complex. However, this complexity must be solved, because even a very large manufacturer feels the necessity of securing its share of the business done by jobbers and dealers, which in the aggregate is often very heavy.

The jobbers' demands are often unreasonable, and they almost invariably place an exaggerated valuation upon the benefit of an exclusive agency.

It is often the mission of good salesmanship to cause the modification of unreasonable demands and to convince the jobber that an exclusive agency often entails an obligation beyond his power to meet, and results in a less volume of business for him than if the powerful manufacturer were helping him to mould opinion and leaving him to enjoy that share which his closer proximity and acquaintance and his better facilities as a convenient distributer, would necessarily insure.

While the jobber often expects, and even demands, more than can be profitably accorded him, the manufacturer also often is unwilling to grant as much as could be allowed upon a profitable basis. The ghost of possible "diminishing returns" so haunts the average manufacturer as to scare him into a selfishness and conservatism that reacts upon the wrong side of the ledger. In many lines of business the manufacturer should not be unwilling to share liberally in the expense of exploitation, when necessary or advisable.

The whole problem is purely one of salesmanship. As long as the education of salesmen directly in the employ of manufacturers is so strangely neglected I for one do not expect that exercise of wisdom and foresight on the part of the manufacturer in his relation to the jobber, which would lead to progressive trade speculation. In the sale of some specialties where it has repeatedly been demonstrated that even limited and superficial training of salesmen will yield very quickly, returns of from 100 per cent to 1,000 per cent, it is unaccountably strange that manufacturers do not highly train their own salesmen, and to a greater extent than at present, the salesmen of their associate jobbers.

Often the negative attitude of the manufacturer demonstrates the broadest and most admirable spirit of liberality, while its positive attitude spells to the jobber the "sink or swim" policy. In other words, they are willing to see the jobber make almost a clean sweep of the trade and will help him to do so when called upon, but are unwilling to take the initiative and by voluntarily spending a little money point out the way by a thoughtful program of business building methods.

If every general sales manager and branch manager of the larger manufacturing companies could realize and grasp to even a very limited extent the dormant potentiality resting in the jobbing trade and would systematically co-operate with said trade, the results would inevitably prove not merely an improvement, but a veritable revolution in business-getting methods.

The salesmen of manufacturers should first scientifically educate themselves and then encourage and intelligently instruct the salesmen of jobbers and note the response and consequent results. Resourceful salesmen can often reverse the natural order of things and by the power of faith, initiative and self-reliance, become, by example, teachers and leaders of their managers. Managers are only human, the problem of marketing goods has not been wholly solved, and no salesman should feel abashed in either receiving from or in giving to his company's officials. We salesmen should try to support our officials and not lean too heavily upon them.

The element of speculation, in great-

er or less degree, appears to be universal and implanted in every human mind. "Hope, that springs eternal in every human breast," is but another name for it. Speculation and hope, in the scheme of evolution, are the exciters of nature's great dynamo of continuous development.

The work of training is a never-ending work, because of the never-ceasing absorption of new products and the consequent perpetual in-rush of new and inexperienced salesmen and great trade expansion. The average salesman can not and will not take the initiative. He utilizes but a small percentage of his brain power. He is unconscious of his undeveloped and dormant faculties. His waste forces exceed those utilized.

Co-operation to me does not mean exclusive territory, nor the turning over of unearned business, nor any measure of apparent helpfulness that does not spell to the jobber and his salesman self-reliance and greater knowledge of his sales products and greater skill in salesmanship.

Thought precedes action and theory while the result of practice with thinkers capable of deduction and initiative should precede practice in the case of the person of only average ability and resourcefulness; hence, the wisdom of studying the theory of business-building through such means as the Sheldon School.

The thought I desire to impress upon manufacturers is the great advantage of investing something in time and money to impart to the salesmen of jobbers a little knowledge, some supervision, suggestion and sympathy and to observe and enjoy the certain results of increased business at the minimum expense of exploitation.

Salesmen are human and some of them are deplorably so. Manufacturers with an established sales organization readily recognize the incompatibility or illiberal competition with an allied jobber. The salesmen of such manufacturers can not be expected to take this liberal view of the situation until the manufacturers' systems of sales credits are so adjusted as to protect their salesmen and to make them natural and loyal allies of the jobbers' salesmen, and not competitors.

A very small number of selfish and thoughtless salesmen in the ranks of either the manufacturer or the jobber can quickly destroy harmony and make inefficient the best attempts toward successful co-operation.

The Union Electric Company, Pittsburgh, Pa., reports a heavy demand for line-construction material from central stations and for general supplies from the coal operators and coke producers. The company is also finding it difficult to supply the demand for Brilliant Mazda lamps. Plans are making for a sales conference for January 2, 3 and 4. P. R. Goldey, representing the company in the West Virginia and lower Ohio field, is now making his headquarters at Parkersburg, W. Va. The city and retail departments of the company are preparing for the largest and best holiday season in its history.

The Illinois Electric Company, Chicago, Ill., in the future will be represented in Western Canada by Houston & Company, 557 Henry Avenue, Winnipeg, Manitoba.

Robinson, Nelson & Company, Richmond, Va., is conducting a special campaign on telephones and heating devices. Considerable activity is reported in Virginia and North Carolina. The company has added J. C. Dibbrell to its sales force, to represent it in North Carolina and South Carolina.

The Harry I. Wood Company, Louisville, Ky., reports that it has received a contract from the city of Frankfort, Ky., to install and furnish 39 street standards for the "White Way" in that city. This company is also completing the work in the Shopinsky department store, one of the big mercantile enterprises of Louisville.

The Pettingell-Andrews Company, Boston, Mass., has published a beautiful book entitled "The House Electrical." Entirely outside of its strictly utilitarian advantages this book is of the highest possible class in so far as its technique and its typography and book-making are concerned. The material is chosen with that degree of expression that will secure ready response upon the part of the ultimate consumer. It cannot fail to convince the recipient of the artistic value of electrical fittings, at the same time assuring him that the ideas are all intensely practical and within reach of the ordinary pocketbook. The material has been prepared under the direction of Carroll Westall, manager of publicity, and the least that can be said of it is that it is entirely and very much to his credit.

The Pacific States Electric Company, San Francisco, Cal., announces the purchase of the merchandise and good will of the Holabird Electric Company, 307 First Avenue, Seattle, Wash. The company is experiencing a brisk demand on Phillips O. K. weatherproof wire and Union Metal Manufacturing Company's street posts. The company has just moved into its new six-story building at 575 to 579 Mission Street, San Francisco. The company now has warehouses and stores in San Francisco, Oakland, Los Angeles, Portland and Seattle. The Seattle house will be in charge of F. M. Killam as district manager, who was formerly connected with the San Francisco district. E. A. Norton has also been transferred from San Francisco to Seattle, and W. E. Ayden has been transferred from Portland to Seattle.

The Mohawk Electrical Supply Company, 329 South Warren Street, Syracuse, N. Y., has published a neat booklet describing its warehouse, its ideas of good service, and some lighter information that will be well received by its numerous customers. A. M. Little, manager of the company, reports business conditions good and the outlook promising for nice business in the immediate future.

S. E. Kennedy, who has been re-elected president of the Electrical Credit Associations of Chicago, is treasurer of the Central Electric Company, Chicago. Mr. Kennedy has always taken an active interest in the affairs of the association and his promise that he would again do his best assures the organization another year of fruitful endeavor. The association is loyally supported by practically every supply house in Chicago, and they all responded generously to the request of Secretary Vose for funds for the entertainment of out-of-town visitors upon the occasion of the annual meeting and banquet on November 21.

The Doubleday-Hill Electric Company, Pittsburgh, Pa., held its semi-annual sales convention November 22 and 23.

New Hydroelectric Station in Ecuador.

An order has been placed by the Empreza de Luz y Fuerza Electric Company with a Belgian concern for the installation of a complete plant to generate electrical energy from the water power of the river Chimbo descending the Chimborazo Mountains in Ecuador. The central generating station is to be erected on a site near the village of Bucay, on the Chimbo about 55 miles from Guayaquil. The current is to be generated at 800 volts, 42 cycles, and transformed up to 40,000 volts; then transmitted 53 miles to the low tension station at Recreo, on the left bank of the Rio Cuyas, opposite Guayaquil, where the river is over one mile wide, and there stepped down to 5,000 volts. The complete installation is to cost about $300,000.

Public Service Commissions

CALIFORNIA.

The Railroad Commission has rendered a decision granting permission to the Northern Electric Railway Company to issue bonds in the sum of $10,829,000. Bonds to the amount of $5,500,000 will be sold for the purpose of extending the railroad from Sacramento to Vallejo, where it will connect by boat with San Francisco. Branches will run to Suisun and Vacaville. $225,000 of bonds will be used for improvements to the existing lines. The balance will be used for refunding.

The city of Orange voted the control of its utilities into the hands of the Railroad Commission.

A decision was rendered granting permission to the Mt. Whitney Power & Electric Company to issue $250,000 of bonds. The proceeds will be devoted principally to work on its hydroelectric development on Kaweah River.

A decision was rendered granting permission to the San Joaquin Light & Power Corporation to issue $925,000 of bonds. Of this sum, $320,000 of bonds are to be issued for the purpose of discharging outstanding indebtedness, and the balance will be issued from time to time for the same purpose.

A decision was rendered granting permission to the Pacific Light & Power Corporation to purchase and operate the Eagle Rock Water Company in Los Angeles and Eagle Rock.

MARYLAND.

Permission was granted by the Public Service Commission to the Washington & Great Falls Railway & Power Company to issue $500,000 in five-per-cent bonds and $300,150 of common stock. The stock, with the exception of $150, is to be paid by the company to J. Walter Long and wife for rights of way for the railroad, extending 10 miles from Chevy Chase, on the outskirts of Washington, to the Great Falls of the Potomac and for other property and power rights on the Potomac River. The railway company is authorized to contract with the Chevy Chase & Great Falls Land Corporation for the construction of the railway, paying it the $500,000 in bonds. The engineers' estimates of the cost of constructing the road is $436,960, without allowing for contractors' profits, which would be equivalent to marketing the bonds at 87.4 of their par, which is regarded by the Commission as a reasonable price. The Commission provides in its order that the railway company shall set aside from its net earnings every year after 1917 a sum sufficient to amortize at the maturity of the bonds, the difference between their par value and the actual cost of the contract.

MISSOURI.

On November 19, the St. Louis Public Service Commission made an exhaustive report to the municipal assembly of St. Louis. The St. Louis companies' capitalization is $101,380,000, but the Commission found that the fair value of their property devoted to the public service was only $37,638,668, and that a fair return on this was six per cent. The Commission therefore found that the companies' capitalization exceeded the fair value of the property by $63,741,632. In this connection the Commission used the following language:

"The evil arising from the overcapitalization of public utilities is one of the greatest to be contended with in their proper regulation. Not only is the creation of water in securities against the spirit and letter of the laws of the state, but in the case of public-service companies it is bound to perpetrate wrong either against the purchasers of the securities or the consuming public. It appears to be a sound principle of regulation that the public, in return for special privileges granted, should be required to pay to the public-service companies a reasonable return only upon the capital actually devoted to the public service, and the right to earn on inflated capital should be denied.

"The laws of this state and many other states and the rulings of the courts in valuation and regulation cases are plain notice that fictitious values cannot be recognized in public-utility corporations, and the investor who from ignorance of the wrong attempted against the public, or from motives of mere speculation, buys watered securities cannot justly expect the public to assume losses which are the result of ignorance or the desire for speculative gain."

NEW JERSEY.

The Board of Public Utility Commissioners has dismissed the complaints of the City of Newark vs. Public Service Electric Company and Public Service Gas Company. The public buildings of Newark are furnished with gas by the Public Service Gas Company, and with electricity by the Public Service Electric Company. Charges are made for the electrical energy and gas furnished as if each building were a separate customer. The buildings are located in different parts of the City of Newark and at great distances apart. It was contended that the Public Service Electric Company and the Public Service Gas Company have established a rate of discounts, the discount increasing with the consumption, and that if consumption at the several public buildings, at different points of distribution, were combined, the rate of discount would be larger than the several discounts allowed at the several installations. It was complained that the consumption of gas and electricity should be so charged as to give the city the benefit of this discount. The Board ruled that if this were done, it would be a discrimination in favor of the city, unless the same rule applied to all owners of more than one piece of segregated property.

The Board has approved an ordinance of the Board of Chosen Freeholders of Monmouth County granting to the Middlesex & Monmouth Electric Light, Heat & Power Company the right to construct and maintain a pole line.

Application of the Penns Grove Electric Light, Heat & Power Company for an issue of its capital stock to the amount of $25,000, and its bonds to the amount of $25,000, has been approved.

NEW YORK.

The Public Service Commission, Second District, has authorized the Genesee Light & Power Company, operating in Batavia, Alabama, Oak-

field and Newstead, to execute a first mortgage upon its plant to secure an issue of twenty-year six-per-cent bonds to the amount of $150,000. The company is authorized to issue $47,000 of such bonds to be sold at once, at not less than par.

The Commission has directed its counsel to commence an action against the Oswego River Power Transmission Company by a mandamus or injunction to prevent it from continuing the furnishing of electricity for power purposes to certain manufacturing establishments in the city of Fulton. The Fulton Light, Heat and Power Company, which is now operating in Fulton, complained to the Commission that the Oswego River Power Transmission Company had a permit granted to it by the Superintendent of Public Works to erect poles and string wires along the bank of the Oswego canal in the city of Fulton, and is serving electricity for power purposes to certain manufacturing establishments in that city. The Commission holds that the permit constitutes a franchise and the Oswego River Power Company has not applied to the Commission for permission to exercise a franchise, and is at the present time exercising a franchise without the permission of the Commission. The Oswego River Company claims that it has constructed its pole line and strung the wires in good faith, believing that it was not obliged to come to the Commission for permission to exercise its rights under this permit.

The financial reorganization of the street-railway lines in and about the city of Buffalo has been accomplished and approval has been given by the Public Service Commission, Second District. The street railroads operated in Buffalo, Niagara Falls, the Tonawandas and adjacent territory, known as the International System, have belonged to three separate corporations, The International Railway Company, the Crosstown Street Railway Company and The Electric City Railway Company. The Commission has authorized the merger of the last two companies into the International Railway Company. Owing to legal difficulties the Crosstown Street Railway Company cannot be merged until next April, and pending the actual merger, the Commission authorized the lease of the Crosstown Company to the International Railway Company for 999 years. As soon as the merger takes place, this lease will become void.

MASSACHUSETTS.

The petition of the Bay State Street Railway Company for authority to carry freight and express in Boston, met no opposition at a hearing held before the Railroad Commission. Many Boston and Brockton business men favored the petitioners.

OKLAHOMA.

The Oklahoma Corporation Commission has issued an order citing Lewis T. Hine, owner and manager of the Purcell Telephone Company, to appear before the Commission on December 14 to show cause why an order should not be issued requiring an audit of the books of the company, showing the amount collected in tolls amounting to more than $1 per month for residence and $2 for business service. Complaint was made with the Commission nearly two years ago that the company had increased its rates without obtaining permission from the Commission. The company appeared and asked authority for the raise, stating that it was unable to operate at a profit on the old basis. The Commission decided against it and the case has twice been taken to the Supreme Court of the state, the decision each time being against the company. The matters involved are similar to those in the Oklahoma City case, which has also been on trial before the Commission during last week. In that case the Supreme Court decided that the company's raise in rates by authority of a city ordinance, but without consent of the Commission, was illegal.

Commissioner Maltbie Lectures in New York.

Commissioner Milo R. Maltbie of the New York Public Service Commission, lectured before the New York Edison Company commercial school on "The Relation of the Public Service Corporation and the Public," on December 4.

After defining the difference between the business conducted by a public-service corporation and ordinary competitive business, Commissioner Maltbie likened the functions of the Public Service Commission to a combination of safety valve, test-tube, balance weight, pure-food-inspector and court of arbitration. He then stated that there was "no class of corporations in the First District with which we have gotten along better and with less friction than the lighting companies and among those at the head of the list is the New York Edison Company."

"There are at present," he said, "only two companies supplying Manhattan with electric light in a large way. In the old days the city was covered with companies all competing, while the two existing corporations are not competing companies in the old sense. The whole tendency of the electric lighting business is to eliminate competition. The present-day movement is toward the consolidation and unification of management and we are coming to the day when it will not be possible for a consumer to take of more than one company.

"I have sometimes called the Public Service Commission a safety valve; you may indeed have heard it called many other things which we shall not mention here. Before the establishment of public-service commissions, a dissatisfied consumer had to go and wrestle with the company. There was no one to decide whether the corporation was doing what it ought to. We sit therefore as arbitrators. We give the complainant a chance to be heard. Indeed nine-tenths of complaints are settled before they even reach the commissioners. Usually an off-hand recommendation is given, though some of the questions put to us would make Solomon pause, and I believe he is reputed for his quick decisions under difficult circumstances.

"In its testing of meters, the Commission serves as a test tube, and in its examination of securities to be issued, we are something like a pure-food inspection in the financial line.

"It is not for a public service commission to run your business, though some of you may think we do, but for the commission to protect the public from the corporation and the corporation from the public. I think if meters were tested more frequently by some of the smaller electric companies it would be good for those corporations. If small corporations knew more about their service and its cost, they would have fewer complaints and fairer prices."

Following this, Arthur Williams, of the New York Edison Company, announced that he would award three cash prizes for the three best papers on Commissioner Maltbie's address. The first prize will be $15, the second $10, and the third $5.

Subway Contractors Using 10,000 Horsepower.

In spite of the fact that there is a veritable army of workmen in the pits and bores of the Lexington Avenue and Broadway subways, New York City, more than three horsepower of Edison service is being used by the contractors to every one man at work, or, to speak in figures, there are 3,280 men laboring in the excavations and 10,000 horsepower of electric current employed in helping them build these future arteries of transit.

The power is used in numerous ways, from the operation of air compressors to the heating of soldering irons. Heavy hoists and derricks are being worked by it, light is being furnished by it and practically every apparatus needing more than man power is harnessed to it.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 107.—Thermal Cutout for Flatirons.—I understand that there have been patented several thermal cutouts for use with electric flatirons to open the circuit automatically when a certain temperature is reached and thus prevent burning out of the heating element. Has any iron on the market been equipped with a device of this kind that is both reliable and foolproof, so that it can be entrusted to the ordinary household servant?—W. L., Beloit, Wis.

No. 109.—Electric Radiators.—Why are electric radiators not so generally used in this country as in Germany and England?—B. T., Baltimore, Md.

No. 110.—Commutator Trouble on Railway Converter.—At the substation where I am employed we have a 2,000-kilowatt General Electric rotary converter that gives a peculiar trouble on the 600-volt direct-current commutator. It is a six-phase machine with 672 commutator bars, 12 equalizer rings and 96 equalizer taps; the equalizer is on the negative side of the machine. Black spots sometimes appear on the commutator; these are the width of the commutator and extend over two bars, sometimes thr . There are 8 positive and 8 negative brush brackets and there appear 8 of these spots about 82 bars apart. Recently after sand-papering the commutator the spots were gone for 17 days; then they reappeared, first the width of two brushes on inner end of commutator and now they again extend the full width. but they are 27 bars ahead of where they formerly appeared. What causes this and how can I remedy it?—P. B., Chicago, Ill.

No. 111.—Harmonizing Street, Window and Sign Lighting.—I have read many articles and papers pointing out the requirements to be met in securing the best possible lighting of a business street by means of ornamental tungsten-cluster posts; also other papers showing what is most desirable in store-window lighting; also a few articles on sign lighting. I have seen nothing, however, to indicate how these can be harmonized. Now it is contended by some people that these three kinds of lighting conflict more or less. Suppose a central-station company had the opportunity to recommend the arrangement of all these kinds of lighting in an ideal business block, what would be the most harmonious and effective way of doing so? In other words, toward what ideal should a solicitor work in producing an attractive and well balanced illumination?—J. S. M., Memphis, Tenn.

Answers.

No. 102.—Fenders for Automobiles.—The City Council is considering an ordinance requiring all automobiles, electric as well as gasoline or steam, to have fenders. While it is true that fenders on street cars running over a smooth track have been instrumental in saving life, I believe that it is not at all feasible to use a fender on an automobile which must run over rough pavements, through ruts and over other obstructions that would very quickly crush a fender and possibly cause a serious accident to the automobile and its occupants. Has an effective automobile fender ever been developed? Are they required in any American city?—M. C., Chicago, Ill.

This matter has been agitated in many city councils and newspapers, but always with the same result, that is, the impracticability of any such requirement because no practical and effective automobile fender has been developed and in all likelihood will be developed until we have ideally smooth street pavements and roadways. The inquirer, himself, makes the reasons for this plain. Patents have been issued on fenders intended for automobiles, but when tried out, those that ever reached such development were found absolutely unreliable and worthless. It has been proposed to have a drop fender which should be operated by pressing a pedal or working a lever when emergency demands this, but this would only complicate driving still more and in most cases confuse the driver so that he would forget to apply the brakes. In modern automobiles the brakes have been so highly developed as to be able to stop a very fast car in a surprisingly short distance. Enforcement of the general ordinances against speeding in cities and requiring automobile drivers to have a license attesting their competency will diminish accidents very much more than any drastic requirement of fenders that are nowhere in existence. It is fortunate that no city has taken such an absurd stand which would mean the banishment of the automobile from its bounds.—B. A., Detroit, Mich.

No. 106.—Progress Payments for Knob and Tube Work.—In conduit wiring it is customary among contractors to receive 60 per cent of the contract price on completing the roughing-in work, this comprising the installation of all the conduit, outlet boxes and so forth. What is the practice in this regard on large knob-and-tube jobs, in which the roughing work includes a much larger percentage of the material and labor to be supplied? Is 60 per cent or a larger part of the total cost demanded?—W. T. K., St. Paul, Minn.

This practice varies somewhat in different parts of the country, and to a certain extent among contractors in the same town. I usually render a bill for 80 per cent of the total price when the roughing-in is finished; this means all circuits and wiring installed except the hanging and placing of fixtures, switches, receptacles, bells, etc.—I. B., Evanston, Ill.

No. 108.—Lighting Store Windows from the Outside.—Has any extended use been made of the scheme of lighting store windows from the outside by means of single powerful lamps equipped with lateral reflectors to throw most of the light into the window and allowing some on the sidewalk? I saw an installation of this kind, which, while not artistic, seemed to be effective and certainly was economical. What, if any, objection could there be to such a scheme carried out so as not to be hideous?—J. P. C., Nashville, Tenn.

Lighting a show window from one large unit located either inside or outside the plate glass would be objectionable, first, because the light would be poorly diffused, causing objectionable shadows; second, because no commercial forms of reflectors are available for any light-source which would produce the necessary distribution of light over the window. The best that could be done would be to design and construct a reflector for each window which would give approximately uniform illumination on a certain plane; this could only be done at considerable trouble and expense, and even then would be unsatisfactory on account of the light all being radiated from one source. The only reasons for locating a lighting unit outside of a window would be the possibility of using a form of lamp which requires frequent attention, such as an electric arc or gas "arc," and the lessened difficulty of producing the required distribution of light, due to the increased distance from the goods to be lighted. With any such plan, a loss of from 20 to 30 per cent would probably be caused by absorption in the plate glass and reflection from the surface of the glass, and with any form of reflector on the market today for large tungsten lamps, electric arcs or gas "arcs," the efficiency would be extremely low, because so little of the total light generated would be directed in a useful direction. Any such arrangement would, of course, be very unsightly. The only successful method of attacking the show window lighting problem is that first proposed by Messrs. Cravath and Lansingh in 1907. The practical application of this method will convince any one that there are no reflectors available at the present time which have a distribution curve of the form required for the maximum efficiency, even for small light-sources, in windows of ordinary proportion. The writer has found that the best results to be obtained from any commercial forms are given by the X-Ray Helmet and Holophane concentrating and focusing types, with 40-watt, 60-watt, or 100 watt lamps, mounted close to the transom bar and at a slight angle from the vertical.—A. L. A., St. Paul, Minn.

Report on Patent Office by Cleveland Commission.

President Taft sent to Congress on December 9 the report and recommendations of the Cleveland Commission on Economy and Efficiency following its investigation of the Patent Office, which was ordered to be made by Congress.

The report, which is an exhaustive one, covering 1,100 typewritten pages, is interesting in that it recommends many things which Congress is expected to provide for, either by resolution directing the Secretary of the Interior to have them done, or by incorporating them in a new bill dealing with patent matters.

The report recommends that the Commissioner of Patents be relieved from the duty of considering cases on appeal from the board of examiners-in-chief and from the division of trade marks, in order that he may give his entire attention to the administrative work of the office, and that he be assisted in the administrative work by one assistant commissioner of patents and seven supervising examiners.

It is pointed out that adequate control of the methods and procedure of the 43 examining divisions in the allowance and rejection of applications for patents is necessary to secure efficient work. The commission bases the recommendation that the Commissioner of Patents be relieved from judicial work upon the fact that the number of invalid patents issued is due largely to a failure to supervise and control the work of the examining force, leaving the decision on applications to the 43 principal examiners. Their decisions, if favorable to the issue of patents, are not reviewed. If unfavorable the applicant can appeal.

What He Could Do if Had Aid.

The commission believes that if the Commissioner of Patents were relieved from deciding individual cases and had the aid of seven supervising examiners he could prevent almost entirely the issue of patents which should not be allowed.

The commission reaches the conclusion that the defects in the organization and procedure of the patent office result in a lack of uniformity in the work of the examining divisions. These defects are due to the organization remaining the same as it was 50 years ago, when the business of the office and the force of examiners were very small when compared to the conditions at the present time. With a corps of examiners numbering nearly 400 it is impossible for the Commissioner of Patents, with his present duties of deciding cases on appeal, to give to the administrative work of the office the attention that is essential.

Abolish One Appeal.

The commission has recommended that instead of an appeal to the board of examiners-in-chief and a second appeal to the Commissioner of Patents, the board be increased from three to five members, and all appeals within the office be taken to this board.

The commission recommends that the fee for filing an application for a patent be increased from $15 to $20 and supports its recommendation by the statement that the fee of $15 is too small to warrant the necessary time being given to the examination of an application. This change in fee, it is estimated, will increase the annual revenues of the Patent Office by $200,000.

Term of the Patent.

An important recommendation is that the life of a patent be so limited as to expire 19 years from the date of filing the application, excluding the time, not exceeding two years, during which an application may be involved in interference. The commission reports that under the law, which allows an applicant one year in which to answer any action of the Patent Office, there have been many applications kept pending in the Patent Office for ten years or more. The commission believes that the remedy is to make the term of the patent commence from the date of filing the application, as is done in foreign countries.

Examining Applications.

The commission reviews at some length the work of reclassifying patents and digesting printed publications as an aid to determining quickly and accurately whether an applicant is entitled to a patent, which work has been in progress for some years. It urges an appropriation for an adequate force to complete this work within five years.

Raising the subscription price of the *Official Gazette* from $5 to $10 is recommended and a change in the method of distributing copies of this publication to libraries is suggested. It is recommended that instead of publishing in the *Gazette* the first five claims of a patent, a brief or summary of the patent be published so as to give a better idea of the patent.

It is recommended that all the work of producing the publications of the Patent Office be turned over to the Government Printing Office.

Subjects Not Reported On.

In concluding its report the commission refers to several subjects upon which it was not authorized to make recommendations, such as the proposal to create a United States Court of Patent Appeals, to have jurisdiction in patent causes now exercised by the circuit courts of appeals in the nine circuits of the United States. It reports that the creation of this court is favored by practically all the attorneys interested in patent causes and by inventors generally.

Although it makes no recommendation upon the subject of the extent of the monopoly granted by a patent or the question of compelling a patentee to work his patent or grant a license to others to do so, the commission sets forth in an appendix the law and procedure of Germany and England on these subjects with papers discussing the patent systems of other nations.

Improving Patent System.

After a review of the history of the United States patent system the commission concludes that the remedy for the evil of granting invalid patents is not to be found in a departure from the plan of granting a patent only after examination, but in perfecting the examination system established 76 years ago and afterward adopted by other nations.

The great development of our patent system, as shown by the filing of 70,000 applications a year and the granting of 33,000 patents, has made inadequate, says the commission, the organization and procedure of the Patent Office, as well as the procedure in the courts. The commission expresses the opinion that to meet the conditions which cause complaint it will be necessary to build up the patent office so as to justify making its decision final on many questions and not allow every question concerning the validity of a patent to be litigated in the courts. Then, it is said, a patent will be more than a preliminary to a lawsuit, where often the victory rests with the one who can best bear the expense.

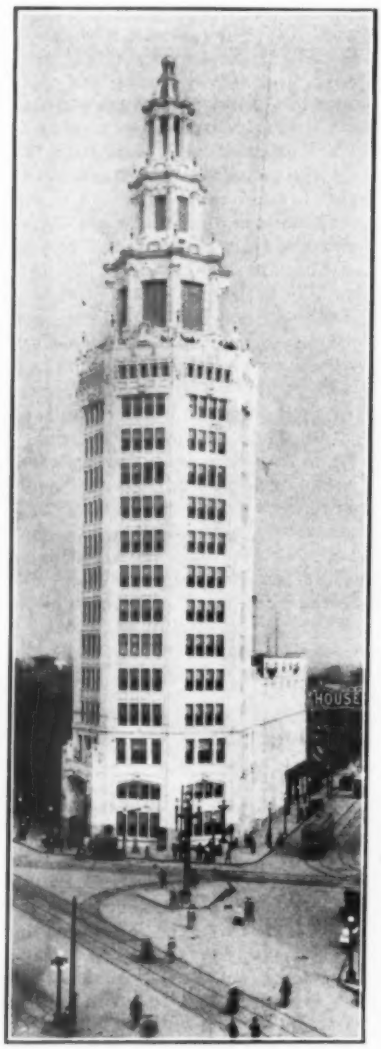
Institute of Radio Engineers Meets.

The final meeting for the year 1912 was held at Columbia University on December 4. E. J. Simon read a communication from G. Seibt describing in detail the latter's new direct-reading wavemeter, and added some interesting data from his own experiences with the instrument. One of the meters was shown. The Committee on Standardization reported progress, stating that some of its conclusions would be presented before the Institute at an early date. The editor of publications announced the issue of a new pamphlet containing the constitution and a directory of members. Three recently delivered papers are to be printed in the forthcoming number of the Proceedings. January 8, 1913, was chosen for the next meeting, at which the results of election of officers for the new year will be announced and the annual reports read.

LIGHTING OF THE BUFFALO GENERAL ELECTRIC COMPANY'S NEW BUILDING.

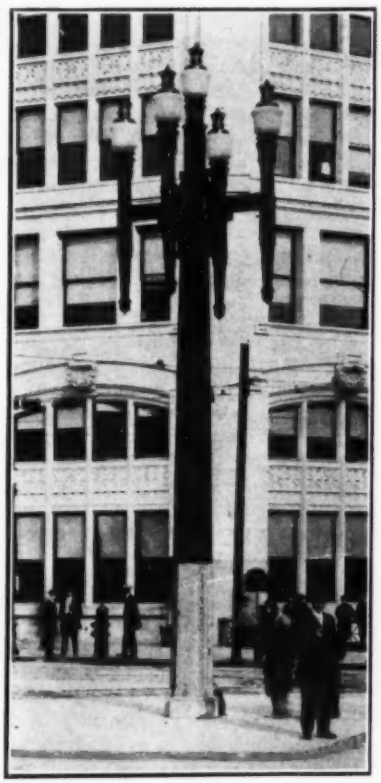
An Exemplary Achievement in Exterior and Interior Illumination.

In the city of Buffalo, N. Y., there has been completed, recently, a novel and exemplary installation for the electric illumination of both the exterior and interior of a modern office building. It is the new structure erected for the Buffalo General Electric Company. Located at the crossing of three streets it occupies a commanding position, which has been emphasized by its imposing architectural design. The main lower portion of the building fills an irregularly shaped lot, and is four stories high. On the principal corner the building rises in the form of an octagonal to a total height of about 300 feet. The top of this tower is of beautiful monumental design. The entire structure is of the most modern fireproof construction. White glazed terra cotta is used for all the exterior surface, and this gives the building a striking appearance, both by day when illuminated by sunlight, and by night when the electric-lighting equipment comes into play.



Buffalo General Electric Company Building.

Since the building forms the headquarters of the Buffalo central-station company, it was decided to make its lighting of the most up-to-date character and also as original and distinctive as possible. The design of the entire illumination and all matters bearing upon it was therefore turned over to the Illuminating Engineering Department of the General Electric Company, Schenectady, N. Y., where it received the close personal attention of W. D'Arcy Ryan, head of this department. Under his immediate supervision all the lighting plans and specifications were drawn up, all lighting units located, many special fixtures designed and other features related to the lighting effects, such as selection of interior finish and decorations, window shades, etc., passed on. The value of entrusting these matters entirely to a progressive illuminating engineer is shown by the happy results achieved in this installation, which marks an era in office-building lighting.



Special Lighting Standard in Front of Building.

The exterior illumination is boldly carried out so as to bring out the predominating architectural features of the building at night. On account of the nature of the design it was considered impracticable to outline the structure by means of small lamps. Therefore it was decided to employ the new ornamental luminous or magnetite arc lamps for this purpose. For lighting the sidewalks and the lower facade of the building, nine of these lamps are mounted on ornamental standards set at the curb line of the sidewalk. There is also a special five-lamp cluster on a column of monumental design located at the center of a small shelter island at the middle of the triple street crossing. Over the cornice of the lower portion of the building are six of these luminous lamps. Much of the light from these and from the street lamps serves to illuminate the walls of the building and tower, mak-

Night View of New Building.

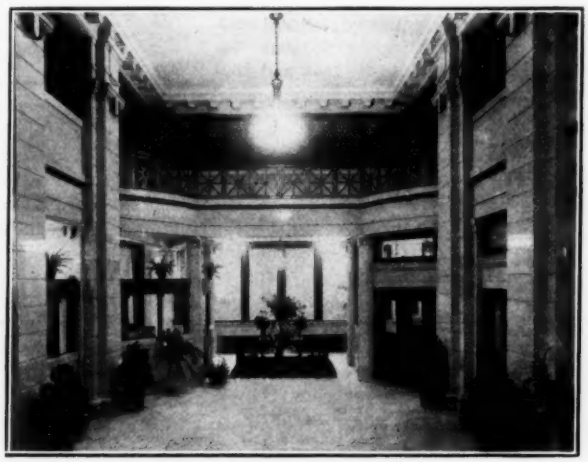
ing their whiteness stand out conspicuously against the dark sky. This effect is relieved by the more yellowish and warm color tone of the windows, both from the tungsten lighting within and the kind of window shades employed.

On each of the three receding steps at the top of the tower are eight ornamental luminous arcs that give the summit of the tower a most striking aspect. All of the luminous arc lamps used in the exterior lighting are of the 6.6-ampere direct-current type. The beauty of the latticed windows in the thirteenth, fourteenth and fifteenth stories of the tower is brought out by lighting them strongly from within by means of special fixtures with tungsten lamps that also serve to give sufficient semi-indirect illumination to the rooms inside. In order to give a more realistic appearance to the colonnade just beneath the crowning dome, it is illuminated inside by means of special concealed lamps, giving a bluish or purple tint to the interior that contrasts with the strong white light thrown on the exterior of the columns and produces a kind of shadow effect and yet fully reveals the constructional features. At the apex of the entire tower-lighting scheme are three revolving searchlights in the dome that can throw a variety of white and colored beams for many miles from their crowning height of 300 feet. These 30-inch projector lamps are mounted on a motor-driven revolving platform, and each projector has also a separate motor so that it can be revolved independently on its own center. A large assortment of color screens is available which, with the many possible projector movements, permits the giving of veritable color symphonies.

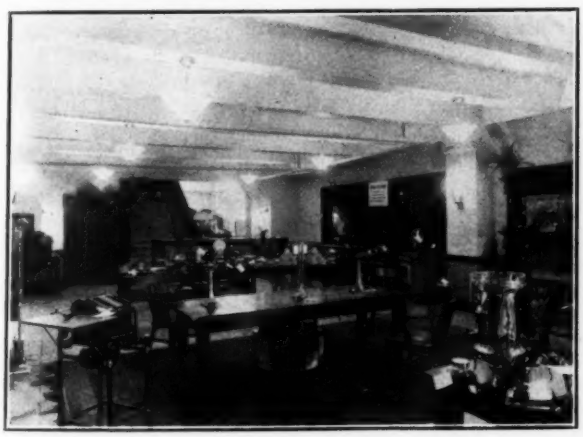
To the interior illumination of the building there was devoted a great deal of thought and study, with results that are unique. In general the illumination is of the semi-indirect type, this being practically the first office building in which this kind of lighting is almost exclusively employed. The result is the practical absence of glare and the production of an abundant, warm and pleasing illumination in every room in the structure. In fact, the installation is a striking example of the excellent lighting that may be had by skillful use of semi-indirect equipment. Very many of the fixtures were specially designed for this installation.

The basement, first, mezzanine and second floors are occupied by the Buffalo General Electric Company, for general and executive offices, exhibition and sales rooms, drafting room, substation, store rooms, etc. The third floor and entire tower is leased to various tenants for office purposes. For lighting these rooms and also for the general offices of the central-station company, Mazda Monolux convertible lighting fixtures, such as those shown in the office of the contract department, were chiefly used. These are nearly always installed as semi-indirect units, but at the request of the tenant they can readily be changed to direct units by inverting the leaded Spectrowhite shade. In the rotunda, the public offices on the first floor and the handsome executive offices on the mezzanine floor special semi-indirect

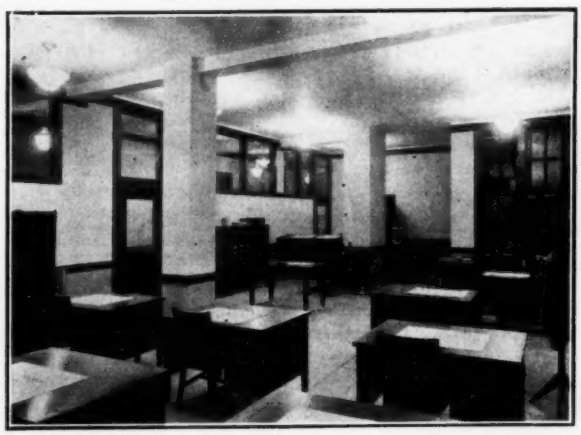
Night View in Rotunda of Building.



Corner of the Rotunda at Night.



Exhibition Room.



Contract Department.

fixtures of rich design were installed; two of these are shown in the views of the rotunda.

The total floor space in the building is 76,800 square feet and for this the connected lighting load is about 108 kilowatts, thus giving an average of 1.4 watts per square foot. Except in a few special cases the illumination on the working plane throughout varies between four and six foot-candles; in the drafting room it is somewhat higher. In numerous tests the ratio of minimum to maximum illumination was found to lie between 0.42 and 0.80. The lamps used in the various fixtures are 60, 100, 150, 250, 400 and 500-watt Mazda lamps, depending on local surroundings.

Electric Iron Smelting at Heroult, Cal.

A very interesting account of the first practical electric iron-ore smelting plant was given in a recent issue of the *Journal of Electricity, Power and Gas*. The plant is located at Heroult, Shasta County, Cal. This site, while somewhat difficult of access on account of the ruggedness of the country, was chosen because of the proximity of all the necessary raw materials: Iron ore of high quality, limestone and quartz for flux, wood for the charcoal used as reducing agent, and low-priced electric power which is employed to develop the necessary heat in the smelting furnace.

On the mountainside within 1.25 miles of the main plant is an extensive deposit of magnetite containing about 70 per cent iron. It has been exposed by quarrying directly into the face of the ledge. Adjoining this is a limestone quarry. These materials are brought to the smelter by a narrow-gauge tramway. At the main works are six buildings: A boiler house for steam generation, the ovens or retorts in which charcoal is made from cordwood, a refinery for distilling and collecting the by-products of charcoal manufacture, the limekilns for burning limestone, a substation in which high-tension hydroelectric power is transformed to 2,400 volts, and finally the furnace and pig-casting building.

The electric furnace, which has been operating continuously since September 5, and which turns out six to seven tons of the highest grade soft pig iron three times a day, is the sixth one developed and installed in the plant in as many years. The five predecessors were one by one found to have serious weaknesses or shortcomings that placed them in the experimental rather than commercial class. The present furnace is a decided modification from the original Heroult furnace installed and has been completely successful from the start. Two similar furnaces, but of somewhat larger capacity, are under construction and almost completed. Three others will be installed immediately, thus giving a total of six furnaces.

The present furnace, despite its protracted evolution, is of simple construction. Its outer dimensions are 27 feet long, 13 feet wide and 12 feet high. It is really a rectangular steel box with heavy fireclay-brick lining. The lower portion tapers inward and the hearth for the molten metal slopes toward the middle and front where the tap hole is located. Along the roof, which is arched and water-jacketed, are five stacks, projecting 15 feet above the roof; these are not smoke flues, but are used almost wholly for charging the furnace and ordinarily are tightly sealed. Between these stacks are the four graphite electrodes which are fed down by means of jack screws. The electrodes are also water-cooled and are 12 inches in diameter and 4 feet long; their ends are threaded so that new sections can be screwed on to make a continuous feed. Just back of each furnace are three transformers that step down from 2,400 volts to the 40 to 80 volts supplied to the electrodes. The secondary connections to the latter consist of eight copper bars 5 by 0.375 inches, bolted together. Voltage regulation is through eight regulating taps on the primary side, together with an auto-transformer compensator, thus giving a total of 15 steps for adjustment, all of which is effected through a solenoid-operated switch group.

The operation of the furnace is radically different from that of standard blast furnaces. No blast at all is used, in fact practically no air is allowed to get inside the furnace. Control is entirely electrical and must be closely regulated in each of the three phases. For this purpose each furnace has a switchboard panel with three voltmeters, three ammeters, three wattmeters, three power-factor meters, three recording wattmeters, handwheels for voltage control and main switches. Current is on continuously. At the beginning of a charge the power-factor is almost unity. As the smelting proceeds the power-factor gradually falls to about 65 per cent, which practically indicates that the hearth is full of metal and is ready to be tapped. Progress of the charge can be closely followed by the reading of the meters. The maximum power consumption of the furnace is about 2,250 kilowatts.

The proportions of the charge are carefully regulated in accordance with the chemical analyses made in the laboratory. The raw materials are brought to the mixing and charging floor, weighed out and charged into the furnace stacks in layers; a typical charge increment is composed of 500 pounds magnetite ore, 135 to 150 pounds charcoal, 3.5 pounds lime and 12.5 pounds quartz. The cost of this entire process for the production of pig iron is now about $14 per ton.

Aside from the additions to the furnace equipment referred to there is being installed a new charcoal-producing plant and by-products refinery, using the Yost process. It is also intended to utilize machinery to a greater extent in the quarrying operations and in other places, so as to reduce the labor to a minimum. In the furnace and pig-casting building there are already in service a 50-foot electric traveling crane with 20-ton and 5-ton hoists, and a lifting magnet capable of picking up from 1,000 to 2,000 pounds of pig iron.

The plant is owned by the Noble Steel Company, headed by H. H. Noble, president of the Northern California Power Company. To his perseverance and faith in the possibility of electrically producing iron direct from the ore is due this beginning of what promises to become an important industry of California. On account of the scarcity of coal the iron deposits there have not hitherto been developed and pig iron has been shipped to the Pacific Coast from the eastern states and from China. The lack of fuel has been met by the abundance of hydroelectric energy and the development of this ingenious process bids fair to be of much value not only to California and her sister states, but to other districts throughout the world that are confronted by similar conditions.

Electrical Exports for October.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., has issued its monthly summary of imports and exports of the United States for October. From this are obtained the following data relative to the electrical exports for that month.

The total value of the electrical shipments for last October is greatly in excess of that of the corresponding month a year ago and also exceeds the total of last September. The followig are the detailed figures according to the new classification:

Articles	No.	Value.
Dynamos and generators.	.....	$ 244,919
Motors	.....	287,074
Fans	3,346	34,011
Arc lamps	953	16,464
Carbon-filament lamps	63,001	11,732
Metal-filament lamps	176,683	56,499
Telegraph instruments (including wireless)	6,169	31,589
Telephones	58,763	100,845
All other	786,718	1,295,368
Total, Oct., 1912		$2,078,501
Total, Oct., 1911		1,434,650

New Telephone Building for Cincinnati.

The beautiful new home of the Cincinnati & Suburban Bell Telephone Company, designed for telephone purposes only, which will house the general executive staff as well as the main and long-distance exchanges of this company, will be located on the southeast corner of Fourth Avenue and Hammond Street, on the site of the old St. James Hotel which has already been demolished to make way for this improvement.

New Cincinnati Telephone Building.

Towering far above its neighbors, this new building will have a frontage of 83 feet on Fourth Avenue and 120 feet on Hammond Street, and extend to a height of 180 feet above the Fourth Avenue curb line.

The type of architecture will be the French renaissance, adapted to the requirements of a modern office building. The first two stories, forming the base of the structure, will be of white St. Lawrence marble; the main shaft of the building will be built of dark red. rough, wire-cut brick, above which and inclosing the two upper stories in which the main exchange floors will be located, the exterior will be faced with white, semi-glazed terra cotta, veined to match the marble below. The building will be crowned with a balustrade of the same material.

The construction will be made as fireproof as it is possible to make a modern building, with floors constructed of a combination of hollow tile and reinforced concrete, supported on a riveted framework of steel girders and columns.

The elevators and stairs will be inclosed in fireproof shafts, lined on the interior with white, glazed tile. In addition to the fireproof staircase entirely inclosed from basement to roof, there will be an inclosed spiral fire escape, located in the southwest corner of the building, with entrances from each floor and ro f and opening on the Hammond Street sidewalk.

Two stand-pipes will be l cated at extreme ends of the building, extending through the roof and will be equipped with regulation fire hose and racks on each floor. In addition to this equipment for self-protection, these fire lines will be fitted with double steamer connections at the sidewalks and with proper fittings and couplings on the roof for fighting possible fires in neighboring buildings. This will prove of great advantage to the Fire Department, providing two water towers ready for immediate use and operated from advantageous points, against fires in this neighborhood.

The equipment of the building will be up-to-date in every respect, including three high-speed, traction-type, electric elevators, complete lighting, heating and plumbing systems, with lavatories provided for hot and cold water in each office and sanitary drinking fountains on each floor, the water for which will be cooled by a refrigerating plant in the basement. Among other items to be installed will be a government mail chute, a pneumatic-tube system connecting the various departments and a vacuum cleaning system on each floor.

The building will contain ten floors in addition to the basement and attic; three of the stories, the first, ninth and tenth, each being 20 feet high, while the balance average 14 feet in height.

The main entrance to the building will be on the Fourth Avenue side, near the east end of the building; the entrance will be flush with the sidewalk and open directly into the spacious main corridor, which will be lined with Italian marble and contain the stair and elevator shafts.

Each floor has been designed to meet the special and peculiar conditions for which each is intended.

The first floor, which will have the appearance of a large banking room with its tile floors, marble counters and bronze grille work, will contain all of the various departments with which the general public comes in contact, including the contract, complaint and collection departments. In addition to the above, a public pay station is provided opening directly off of the main corridor, which will be open throughout the entire day and night for the accommodation of the public.

The second, third, fourth and fifth floors will contain the various offices, including the administration offices, auditing and billing departments, repair, equipment, building, drafting and other clerical departments.

The sixth floor will be devoted entirely to the long-distance department.

The seventh floor has been designed

to meet the requirements of the heavy and intricate mechanical apparatus for the local exchange which it supports and which in itself forms a very costly feature of the investment.

The quarters of the telephone operators, for their use when off duty, occupy the entire eighth floor and consist of a large rest-room and library, dining-room, kitchen, toilet rooms and baths, all of which will be handsomely furnished by the company.

The ninth floor, which is connected by an additional broad staircase with the operators' quarters below, will be the operating room for the local telephone business, containing the switchboards over which calls are received and connections made in the main exchange district and to the other exchanges throughout the city.

The tenth floor is reserved for a future operating room to be occupied when a revised system of telephone operation is perfected, upon which experts are now working, and which is expected to insure quicker and surer service to the public than now received.

The entire ninth and tenth floors will be floored with compressed cork, with inlaid patterns, assuring a handsome, resilient and noiseless floor to the operators.

A feature of the building will be the roof garden. The roof will be paved with red quarry tile and reserved for the employees for recreation purposes, one of the three elevators as well as the stair shaft being carried to the roof level.

The structure will be rushed to rapid completion, operations having been already started on the foundation work, and when completed will displace the present Exchange Building on the southeast corner of Vine Street and Baker Place. The architects for the new building are Harry Hake and Charles H. Kuck.

International Congress on Electroculture.

The first international congress on electroculture and the applications of electricity to agriculture was held at Rheims, Belgium, on October 24 to 26. Several papers were read on the subject of electroculture.

According to Lieutenant Basty, the growth and maturity of plants are hastened and a finer crop is secured by the application of the methods of Paulin and Schtchawinsky. Germination is accelerated by the passage of a very weak current. On the other hand, M. Kovessi has found the passage of a direct current through the soil in which grain is sown to retard and impair germination, particularly in the neighborhood of the electrodes.

ELECTRIC LIGHTING FOR MOTORCYCLES.

By M. D. Cooper.

Considerable interest has recently been shown regarding electric lighting for motorcycles. The writer has been experimenting along this line for several years with fairly satisfactory results; hence a résumé of his results may be of interest.

Reflector.—A number of automobile sidelamps are to be found on the market which may be adapted to motorcycle service by placing a mounting lug on both sides, instead of only on one side. This reflector has an opening of about six inches, focal length of 0.75 inch, and is equipped with a focusing screw which enables the rider to adjust for a spreading or concentrated beam at will.

Lamp.—The writer has found that an eight-candlepower lamp will give enough light for ordinary riding. In riding about city streets, the street illumination is ordinarily sufficient for road-watching purposes, and the eight-candlepower lamp is not so blinding to pedestrians as would be a lamp of higher candlepower. When out in the country beyond the confusing glare of arc lamps, an eight-candlepower lamp will give light enough to discern a brick in the road at a distance of over a 100 feet and "non-illuminated" vehicles can be discerned at a distance of three or four hundred feet. Besides the concentrated beam, enough light is thrown to the roadway directly ahead so that even the smallest obstacles may be discerned.

The lamp first used was a two-volt lamp with a V-shaped filament. One of these lamps withstood 2,000 miles of travel over all kinds of roads. The shape of filament was not adaptable to parabolic reflectors, however, as it gave a striated beam of light. A coiled-filament, four-volt lamp was found to be very much more satisfactory as regards light distribution and had sufficient strength to withstand a 1,000-mile trip over the worst roads the writer has ever experienced.

Battery.—In the writer's experiments the candlepower of the lamp was limited by the battery capacity. An 18-ampere-hour single-cell storage battery, (size 3 by 3 by 6 inches) originally designed for a hand lantern, was the only commercial product available, but carrying space was found for two of these cells, enabling the use of a four-volt, two-ampere, 8-candlepower lamp.

The subject of motorcycle lighting is now receiving the attention of battery manufacturers, and it is believed that a battery of greater capacity will be developed. It is to be hoped that a six-volt battery will be perfected, so that standard automobile lamps may be used. It is manifestly impossible to make a three-cell battery (six volts) that will be small enough for mounting in the framework below the tanks of motorcycles; hence battery development will probably tend toward a battery, say 4 by 8 or 10 inches and 3 to 5 inches high, that can be mounted above the tank, after the prevalent manner of carrying compressed-gas tanks. With a battery of this size, a high-candlepower lamp (16 to 24) could be used.

Mounting.—When applied to a single-cylinder motorcycle, the writer experienced practically no difficulty due to mechanical weakness of the lighting equipment. When used on a high-power twin machine, however, extra heavy special mountings had to be provided to keep the parts from shaking off, due to vibration. The internal construction of the battery also proved too delicate for the severe strain. As mentioned above the lamps are relatively stronger than the other accessories.

Whatever apparatus is used must be of strong construction and rigidly mounted.

General Systems.—Since practically all motorcycle magnetos are of the high-tension type, they cannot be used directly for lighting. A low-tension magneto or generator, in order to deliver even as much as 10 or 15 watts, would have to be of such a size and weight as to make it impracticable for this purpose. Attempts are being made to produce such a generator or magneto, but the outlook is not promising.

Fourth Annual Byllesby Convention, Chicago.

The fourth annual convention of H. M. Byllesby & Company and affiliated companies will be held in Chicago, Thursday and Friday, January 23 and 24, 1913. Owing to the commercial and construction activities at many of the properties, it has been found necessary to shorten the usual time of the convention from four to two days, and to limit the attendance to local managers and department heads at the home office. The sessions will be executive and the program is now in course of preparation. The convention will terminate with a dinner given by H. M. Byllesby & Company to the representatives in attendance.

Copper Exports.

Exports of copper for the week ending December 5 totaled 6,225 tons; since December 1 5,850 tons; same period last year 8,641 tons.

Electric Lighting and Power in Washington.

It seems almost incredible that the sucess of electric lighting in Washington, D. C. was founded on a melancholy failure, but such is the fact, and it is of interest to note it at this time for the reason that the company which supplies the United States Government with light and power at the capital for use in every conceivable manner has just moved into a handsome new building. This building, which is of terra cotta and white Indiana limestone, is especially well equipped with separate rooms for the display of lighting and power appliances as well as the hundred and one other things nowadays operated by electricity. It was designed by Milburn, Heister & Company, the architects who have designed many of the beautiful government buildings of Washington.

New Office Building of Potomac Electric Power Company.

In the fall of 1881 the survivors of the Army of the Cumberland, so history says, gathered together in Washington to dedicate their statue of General Thomas in Thomas Circle. The people of Washington contributed to the success of that occasion, and committees were appointed to carry out various plans for the entertainment of visitors. One of the new ideas proposed was to illuminate Pennsylvania Avenue from the Peace Monument at the foot of the Capitol to the Treasury Department near the White House with electric light, at that time beginning to be used in a few cities, but entirely unknown in Washington. Guys were stretched at intervals from housetop to housetop, and arc lamps suspended therefrom over the middle of the street. A dynamo was connected with the engine of a sawmill at Thirteenth Street, and at the appointed time thousands of citizens and visitors thronged Pennsylvania Avanue to witness what was then a novel display. The attempt, however, was a failure, for some cause not determined.

The interest, however, which this experiment aroused, grew, and some time afterward a company, of which the present Potomac Electric Power Company is successor, was formed. At that time series arc lamps were the only available electric lamps, and as they were of a very high candlepower their use was confined to exterior lighting or the illuminating of train sheds, depots or other buildings, the rooms of which were of large area.

In May, 1883, an order was given by the Washington company for a dynamo for incandescent lighting. In November of the same year there were in operation 91 arc lamps and 100 incandescent lamps. In 1884 the company installed underground conduits along Pennsylvania Avenue and other streets where it had service mains. Since then many extensions and improvements have been made. Alternating-current generators were purchased, which enabled the company to supply service to the outlying sections.

The original plant was destroyed by fire in July, 1885. While the fire was still blazing arrangements were made to lease the original depot of the Baltimore and Ohio Railroad at Second and B Streets northwest. This site is now occupied by the Census Building.

In 1886 the company built a permanent home on Thirteen-and-a-half Street, installing the Edison system of central-station lighting. New types of generators and engines were adopted as they became available.

The present main generating station of the company, which was started in December, 1906, is located at Benning, D. C., and is one of the most modern in the country. The generators are of the steam-turbine type. Besides its main station, the company has several substations in different sections of the territory it covers. The company has about 20,000 patrons. One of these, the United States Government, is one of the largest customers of an electric light and power company in the world. In Washington, the government has many activities, there being laboratories in which electricity is used in almost every branch of scientific endeavor. Washington, also, is one of the best lighted cities in the world.

A Subway Relic.

Cornell University is to have an interesting relic of the first subway built in New York City more than forty years ago. It is a circular shield used for boring the tunnel, and is additionally interesting because it is the first specimen of this type of boring device ever used in this country. The old shield was recently dug up by contractors working on the new Broadway Subway, and the Public Service Commission authorized the contractor to turn it over to F. C. Beach, one of the editors of the *Scientific American*, and son of the man who invented it and used it long ago. Mr. Beach in turn presented it to the trustees of Cornell University for preservation in the engineering museum. Alfred Ely Beach, father of F. C. Beach, was the engineer and promoter of the Beach Pneumatic Railway which, in the early seventies started to build an underground railroad in Broadway, intending to extend it to Harlem. A short stretch of this subway was built under Broadway just north of the post office. It was bored by means of the shield, and the work was done so quietly that the surface of the street was not disturbed. This section was completed and put in experimental operation. The tube was circular and a circular car was propelled back and forth through it by means of huge blowers placed at each end of the tube. There are still living in New York City many men who rode in this car during the time the tunnel was in operation. The promoters found it impossible to continue the work, however, and abandoned it after spending several hundred thousand dollars.

HEATING WATER BY ELECTRICITY.

By Albert H. Bridge.

So long as electricity cannot be generally used for heating water, on account of the prohibitive cost, it will be impossible for it to drive the gas burner or the coal fire completely out of the houses of any but the wealthy classes. Yet electricity is admirably adapted to fulfill the whole of the heating, lighting and power functions of the domestic household, with perfect cleanliness, convenience and efficiency; moreover, it can be economically utilized for cooking and heating, and even for boiling water, if the proper conditions obtain. The nature of those conditions is easily demonstrated from the known characteristics of electricity supply, which tell us that the cost of generation diminishes as the load-factor increases; the running costs in a large station do not exceed 0.5 cent per kilowatt-hour, and the capital charges, with a load-factor of 100 per cent, are in the neighborhood of 0.2 cent, so that a charge of 0.7 cent returns a profit on a steady continuous load. It is known, also, that at this price electricity can compete with gas at 50 cents per 1,000 cubic feet. The conditions, then, are that the supply of electricity for heating water shall be taken at a load-factor of 100 per cent, and that the suppliers of electricity shall reduce their charges for such a service to a corresponding figure.

While the ideal state has not by any means been attained as yet, there is no doubt that things are working that way in the more progressive places; in England, for example, there is a small society called the "Point-Fives," consisting of central-station managers who have adopted a charge of one cent (0.5 penny) per kilowatt-hour for heating and cooking, and this now numbers about ten members. If this can be done on a commercial basis with a load-factor of, say 30 per cent, it is obvious that the figure we have mentioned is by no means unattainable, given a load-factor of 100 per cent or near it.

On the other side of the account, there appears to be a general agreement that the high load-factor must be achieved by the adoption of thermal storage, and for some years the subject has received a good deal of attention in England. The first system placed on the market was known as the "Therol" system, and was introduced by Messrs. Spagnoletti, Limited, London; the principal feature of this ingenious device was the use of a block of iron to store the heat. The block was cast around a coiled pipe, and was thoroughly well lagged with heat-insulating material, so that an efficiency well over 90 per cent was attained, with an average wait of eight hours—that is, with an interval of eight hours between the storing and the utilization of the heat. The advantage of iron was, of course, that it could be raised to a red heat, if necessary, without injury. The efficiency was greatly improved by inclosing the storage block within, but insulated from, a water jacket, which trapped and retained the bulk of the heat which escaped through the lagging. The construction of the apparatus is shown in the accompanying illustration, Fig. 1, which is a vertical cross-sectional elevation of the Therol heater, and is self-explanatory. An important feature of the device is a mixing tap, which enables cold water to be drawn from the main simultaneously with the hot water which passes through the heater from the jacket; thus water of any desired temperature from cold to boiling can be drawn off. The heater illustrated, consuming 200 watts, and taking in water at 50 degrees Fahrenheit, gives 25 gallons of water per day at a temperature of 110 degrees Fahrenheit—the temperature of a very hot bath. Smaller quantities can of course be drawn off at higher temperatures, and larger quantities at lower temperatures. The current is left on night and day, and as it cannot exceed a fixed amount, no meter is necessary; the daily consumption is obviously 4.8 kilowatt-hours, cost-

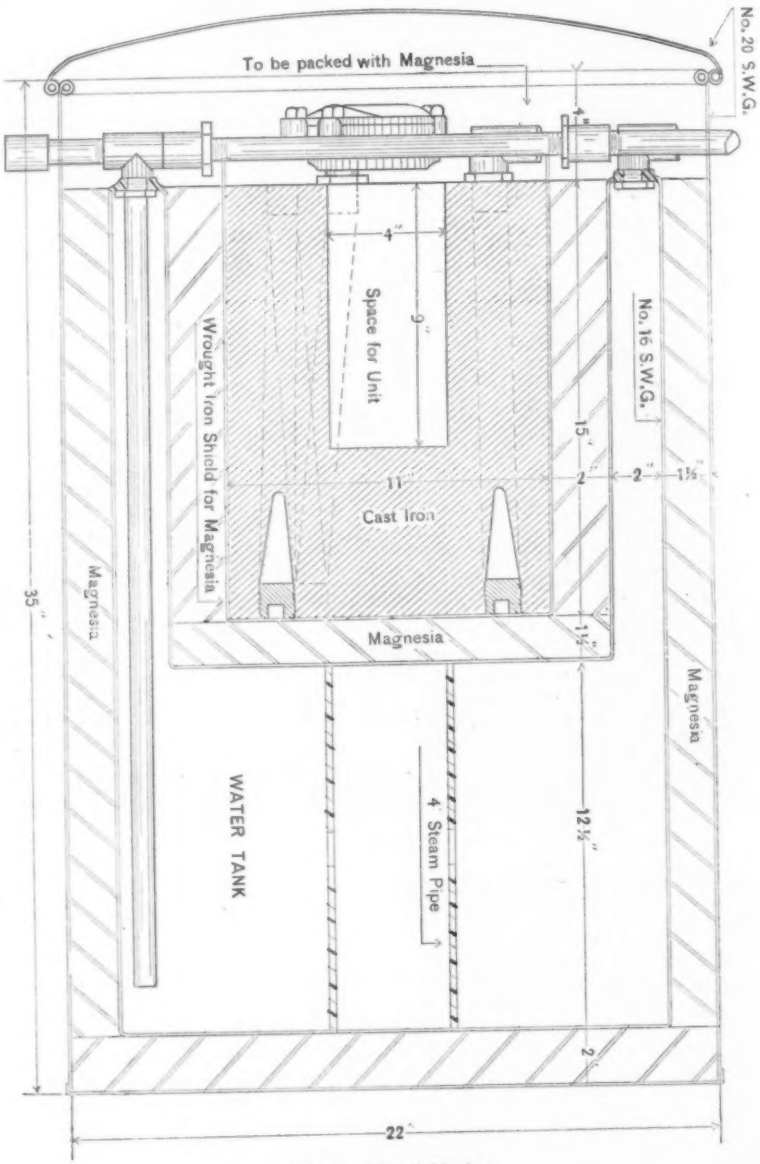


Fig. 1.—Therol Heater.

ing at one cent per kilowatt-hour, 4.8 cents a day. In the latest patterns the iron block is cored, with screw plugs at the ends, which enable the block to be drilled out again if the passages become choked with deposit from the water, as frequently happened with the older type.

The heating units are made to consume from 75 to 1,000 watts, for different sizes and outputs.

Another storage device is that recently introduced by A. Rittershausen, in which the water itself is heated; the tank, therefore, has to be large enough to hold the whole of the water to be heated, whereas the Therol apparatus, which stores heat at a higher temperature, and heats the water during its passage through the iron storage block, need not be so large. In the Rittershausen apparatus the tank is inclosed in a non-conducting jacket

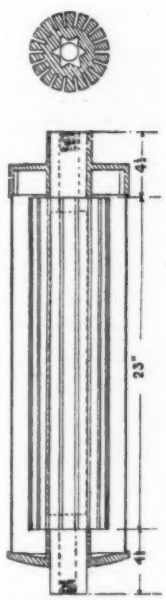


Fig. 2.—Belenus Electric Boiler.

eight inches thick, and the water is admitted to the tank at the lowest point, under a perforated diaphragm, which prevents eddies which would cause the incoming water to mix with the hot water. The heating element is immersed in the water, near the bottom, and is surrounded by a circulating tube, which causes the water to rise past the heating element in a steady current to the top of the tank. Thus the hottest water forms a layer there, and as the outlet pipe is attached to the top of the tank, a supply of hot water is quickly available directly the heater is switched on. If the water is not drawn off, it is displaced by the circulation and slowly sinks, with hotter water above it, until the whole of the tank is full of hot water, when a relay actuated by a thermometer cuts off the supply current. It will be seen (Fig. 3) that the outlet pipe is bent downwards when it leaves the tank; this is to prevent the circulation of water in the pipe, which would cause an appreciable loss of heat; similarly the inlet pipe is always in contact only with the cold layer of water beneath the perforated diaphragm, and as heat is conducted through stagnant water only very slowly indeed, no loss of heat takes place through this pipe. The inventor claims that this device possesses great advantages compared with other methods of thermal storage.

The latest storage heater is one devised by W. R. Cooper, and made by Messrs. Purcell & Nobbs; it is illustrated in section in Fig. 5. The ap-

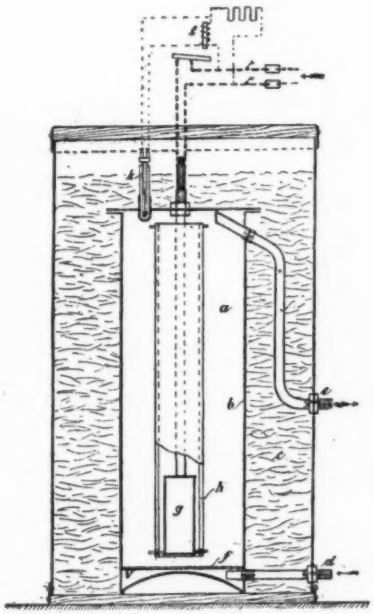


Fig. 3.—Rittershausen Apparatus: *a*, water space; *b*, tank; *c*, nonconducting layer; *d*, inlet pipe; *e*, outlet; *f*, perforated diaphragm; *g*, heating element; *h*, circulating tube; *i*, outlet pipe; *k*, thermometer; *l*, relay.

paratus consists of an inner tank *A*, containing the heating element inclosed in a tube *B*, and an outer annular cylinder *C*, separated from the inner tank by an air-space *D*. Cold water is introduced at *E* in the outer cylinder, the upper portion of which is in communication with the inner tank by stand-pipes *FF*, which enter the bottom of the inner vessel. Hot water is drawn off from the top of the latter, and is replaced by warm water from the outer tank; baffles are provided as shown to prevent the incoming water from mingling with the hot water, so that the whole of the contents of the tank *A* can be drawn off without entraining any of the water which enters from *C*, until the level of the latter reaches the top of *A*. The purpose of the outer cylinder of water is to trap the heat radiated from the inner one, and being always at a much lower temperature than the water in *A*, it need only be lagged with non-conducting material in the ordinary way. On starting the heater, the water in *A* soon becomes hot, so that it can be used without a long wait; if, however, the hot water is not drawn off, the surplus heat is transmitted across the air-space to the outer jacket, more and more rapidly as the temperature of the water in *A* rises, and thus the cylinder *C* serves as a reservoir for heat; it contains about twice as much water as the inner tank. The electrical input being suitably proportioned to the total volume of water,

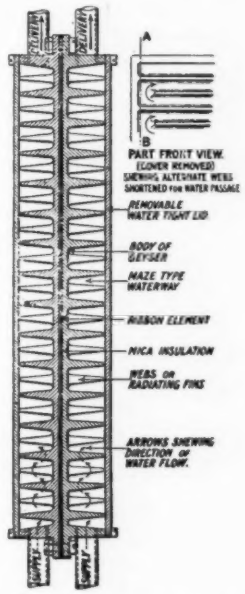


Fig. 4.—Section Through Belling Electric Geyser.

boiling is not likely to take place; but as a measure of precaution, a vent-pipe is attached to the top of *A*, and is led upwards to a sufficient height to prevent overflow.

The foregoing heaters are all of the storage type; there are, however, cases in which an immediate supply of hot water is required, in unlimited quantity, at short notice. For this purpose instantaneous heaters are used, similar to the "geysers" heated by gas. Necessarily heaters of this kind make a heavy draft upon the supply mains, and the electrical energy consumed must be paid for at a correspondingly high price, the load-factor being of a very undesirable nature. Nevertheless there are circumstances in which con-

venience is of greater importance than economy, and the fact that there is a market for such apparatus justifies a short account of their construction.

Fig. 2 shows a section of the Belenus electric boiler, made by Messrs. Eastman & Warne; it consists of a cast-iron block of cylindrical shape, corrugated on the inside in contact with the water, and deeply grooved on the outside. The heating elements, which consist of stout wire wound on refractory supports, are embedded in the slots, and are insulated from the iron by pure mica. Being practically surrounded by iron, the elements give up nearly all their heat to the latter, and they are securely protected from damp. A sheet-steel cover is placed round the boiler, the air space thus inclosed serving as a non-conducting jacket, and the cover can be further surrounded with sheet lagging if desired, to secure a higher efficiency—though this is not so necessary as in case of storage heaters, because the boiler is usually heated only for short periods. The heating element is divided into a number of separate circuits, so that the rate of heating can be regulated, the maximum power taken being from 3 to 9 kilowatts, according to the size of the boiler. It is, of course, obvious that this boiler can be used in conjunction with a circulating system and a hot-water tank, in which case the current can be kept on continuously at the rate of 250 or 500 watts.

The last device to which we shall refer is similar in principle to the Belenus boiler, and is made by Messrs. Belling & Company; its construction is shown in Fig. 4. The body of the apparatus consists of two castings, flat on one side, and provided with fins or baffles on the other, as shown; when the flat cover is screwed on, the water is compelled by these fins to pass to and fro across the face of the casting, thus coming into intimate contact with the metal. The heating element is a sheet of resistance material, formed into a ribbon by suitable alternate slotting so that it has no joints or bends. This sheet is clamped between the two castings, from which it is insulated with mica. It will be seen that the whole of the heat evolved in the heating element must necessarily pass into the metal plates, except a very slight amount at the ends, an efficiency of 95 per cent being claimed. A special feature of the Belling electric geyser is the control, which is applied simultaneously to the water and the electric current; this is shown in Fig. 6. The electric switch is mechanically interlocked with the water-supply valve, so that the current can not be turned on before the water, nor can it be left on when the water is turned off. This is effected by an ingenious double rack and pinion, with a free motion at each end of the stroke. The figure shows the complete apparatus, with double-pole switch and fuses, the cover having been removed. The makers state that, starting with cold water, this geyser in 1 minute 40 seconds yields water at bath temperature—about 108 degrees Fahrenheit. With an input of 10 kilowatts, it gives 12 pints of hot water per minute, or 3 pints of boiling water per minute.

These examples will suffice to indicate that the subject of heating water by electricity is being seriously tackled, and that there is already a demand for apparatus for this purpose. Taken alone, and in the abstract, the system is not economical; but when employed under the appropriate conditions, as explained above, it can hold its own with gas heating, and in all cases it offers unique advantages in point of safety from fire or explosion, absence of smell and noxious fumes, and ideal convenience and cleanliness.

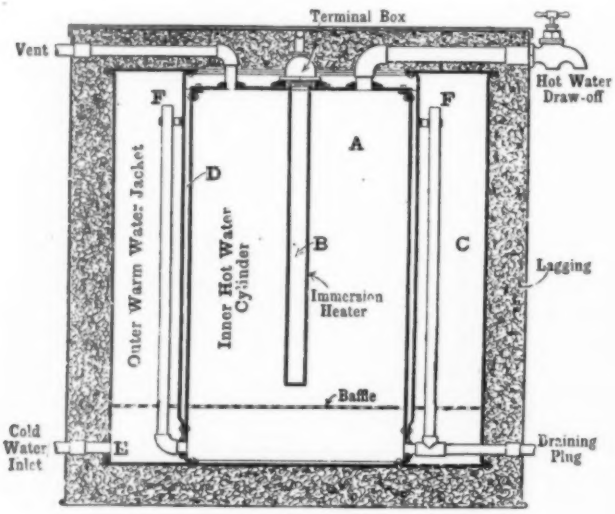


Fig. 5.—Cooper Electric Water Heater.

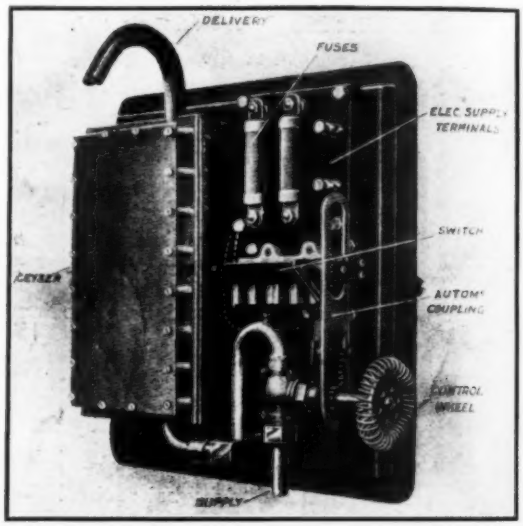


Fig. 6.—Belling Geyser and Control, Cover Removed.

Peoria Electrical Show.

Leroy A. Mills, secretary of the Peoria Show Association, announces that at the second annual electrical show which will be held at the Peoria Coliseum, January 18 to January 25, inclusive, the members of the Illinois Electrical Contractors' Association will be the guests of the exposition. Mr. Mills states that at a meeting of the contractors it was decided to rescind the former action fixing the date of the January meeting, and it is now announced that the convention will be held in Peoria Friday and Saturday, January 17 and 18. The show starts on January 18. Some of the local men desired very much to hold the convention on January 24 and 25 as previously announced. Special entertainment is being provided for the visiting contractors by the Peoria Show Association.

Compulsory Wireless in Canada.

A bill is pending in the Canadian Parliament providing that all Canadian passenger vessels as well as foreign passenger ships touching at Canadian ports shall be equipped with wireless telegraph apparatus. The bill applies to lake and St. Lawrence River ships and will take effect April 1, 1913. There is no doubt as to its passage.

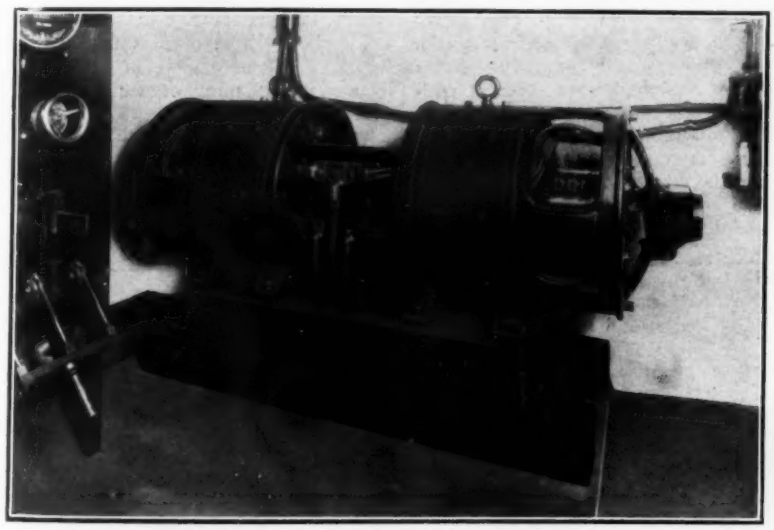
The length of telegraph lines in Peru has increased from 9,500 kilometers in 1908 to 15,000 this year.

New Electrical and Mechanical Appliances

Balancing Sets for Singer Tower Illumination.

It is interesting to note the progress in modern lighting and the different spectacular effects obtained by the use of the high-power electric searchlight. No more notable instance can be cited than that of the ever familiar Singer Tower in New York City, which at night gives the soft touch of carefully planned and concentrated illumination to the twinkle of the thousands of individual lights from the surrounding office buildings.

The line voltage of the Singer Building power plant is 250 volts direct current. To economize on copper for all lighting circuits two 70-kilowatt balancer sets, one of which is illustrated herewith, manufactured by the Diehl Manufacturing Company, of Elizabethport, N. J., were installed. One of these sets is idle at all times except when shifting the load from one set to the other. Each one of these sets consists of two 35-kilowatt, 125-volt, compound-wound, commutating-pole generators, running at 1,300 revolutions per minute. These generators are of special construction, being built with steel frames, laminated pole pieces, and wrought-iron commutating pole pieces. They are of extremely light weight and operate noiselessly, giving perfect commutation up to 25 per cent overload.



Diehl Balancer Set.

The fields of the two machines are in series across 250 volts. The regulation is so close that one does not notice an appreciable falling off in the illumination, even with the load so unbalanced as to give 580 amperes in the neutral wire. This is, however, a rare condition.

The tower lighting itself is also operated on a three-wire system, and while the amount of unbalanced load is much smaller than that of the office lighting system, the balancing set is of the same size and capacity in order that the three sets may be interchangeable. This is an obvious advantage in case of a breakdown. The tower lighting is accomplished by means of 18-inch projectors operating at 35 amperes each and showing an average individual candlepower of approximately 6,000,000. These are supplemented by 30-inch projectors having an approximate candlepower of between 50,000,000 and 60,000,000 each.

A Heat-Detecting Paint.

The General Electric Company, Limited, of London, England, has introduced a most useful material known as Detectheat, which consists of a paint having a bright red color at ordinary temperatures, but turning black when the temperature rises to 120 degrees Fahrenheit or thereabouts, but resuming its red color when cooled again, says *Electrical Engineering*. It is specially suitable for bearings, as showing when a bearing is commencing to heat before there is a danger of seizing up, and should be useful for this purpose in test shops, etc., or for machinery out of easy reach. It is unaffected by lubricating oils, and is free from alkalis or acids. The color changes are unmistakable.

New Models of Waverley Electric Cars.

Among the new models of electric pleasure vehicles that the Waverley Company, of Indianapolis, Ind., is placing in its 1913 line are the "Waverley limousine-four" and the "silent Waverley sheltered roadster." The first of these is a companion to the luxurious "limousine-five" which has attracted so much attention this year. It possesses a novel seating arrangement designed to give the person who is driving the car an unobstructed view ahead while still occupying the customary left-hand rear seat. This is accomplished by using four separate chairs, somewhat resembling those of a parlor car. Three of these, facing forward, occupy the rear of the car in a staggered position, the two outside chairs being placed slightly in front of the middle one.

Thus three grown people are accommodated comfortably with plenty of shoulder and elbow room, and no crushing of fancy gowns and wraps. The fourth passenger sits in ample comfort in a right-hand front seat facing the interior of the car, and there is no seat and no passenger in front of the driver.

This car has been appropriately called "the sociable full-view-ahead electric," as it affords the pleasant intimacy of the old-time brougham, while offering the advantages of the new.

Believing that men would appreciate a thoroughly smart and stylish roadster type of electric, the Waverley Company has evolved the silent Waverley sheltered roadster, a smart little open car that follows the lines of the best gas roadsters. A folding landau top and snug side panels make this car as warm and weatherproof as any electric brougham, adapting it for use throughout the year. Its speed is greater than city driving allows. There is a good day's mileage in every charge, insuring the all-day and every-day service that business and professional men require.

SHOW-CASE LIGHTING.

By J. A. Vessey.

It is beyond the conception of the illuminating engineer as to why the average central-station man will jump at the opportunity afforded for lighting a few feet of show windows when the show cases in most stores, presenting an area about ten times greater, are allowed to go unlighted and neglected.

Just consider this isolated instance and the golden opportunity which might have gone to waste. In a recently completed modern department store in the East there were only 250 feet of show windows to light, while the interior of the store contained an aggregate of nearly 4,000 lineal feet of cases—an opportunity for the sale of almost sixteen times as much current. While the average store does not have 4,000 feet of show cases, it does have a sufficiently large number to make a very inviting proposition.

Probably the central-station man would hesitate to believe at first reading that only from 25 to 40 per cent of the stores of this country use any show-case lighting at all. And more, a large proportion of this percentage is most inadequately lighted, so that additional current could be judiciously used in connection with a properly designed reflector system with a noteworthy increase in display efficiency.

Ordinarily, four 25-watt lamps will suffice to satisfactorily light each eight lineal feet of case. But a very good rule to follow for the proper show-case standard of illumination is approximately double the exterior general illumination. Experience has shown that an intelligent consideration of these two figures will enable any central-station solicitor to make recommendations that can be safely relied upon to secure desired results, and assure in many instances much new business in a field which has as yet been only "scratched" on the surface.

Linolite Show-Case Lamps with Type A Reflector.

Clip for Adjustably Holding Reflector.

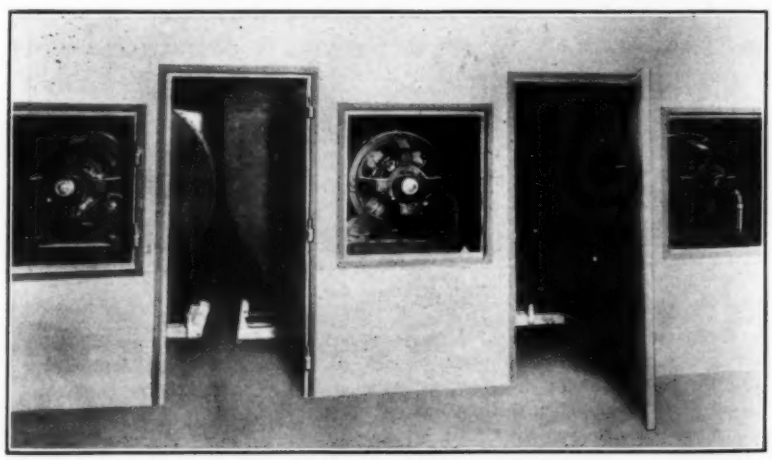
One of the most recent methods introduced for lighting show cases is the J-M Linolite system of illumination made by the H. W. Johns-Manville Company, of New York, which consists of a tubular electric lamp nearly a foot long with the filament stretched out straight. These lamps, complete with reflectors, only occupy a space 1.5 inches deep by 2.5 inches wide and can be easily attached to or detached from the case by means of spring clips. These clips are readily adjusted to the interior of the show case, and firmly support the removable shell in its proper position.

An ornamental or plain standpipe or wire conduit is then run down in a corner and through one end of the case into an outlet box under the base of the case. A single-pole flush switch is usually provided for this outlet box so that the lights of each case may be individually controlled when desired.

Ventilating Motors in the Ritz-Carlton Hotel, N. Y.

It has now become generally recognized that proper ventilation is as essential to health and comfort as proper heating. Well designed modern hotels, office buildings and apartment houses are now seldom heated directly with steam radiators with no provision for ventilation except the windows, but the heating is done by supplying fresh warm air, which also permits effective ventilation. Moreover, advantage is taken of the system to supply cool air in summer, thus taking another step in the direction of increased comfort.

This system is well exemplified in the Ritz-Carlton Hotel at Forty-sixth Street and Fifth Avenue, New York City. A large annex is now in course of erection and the accompanying view and description are of a part of the ventilating system used therein.



Motor-Driven Ventilating Sets in Ritz-Carlton Hotel.

Because of the arrangement of the building, the ventilating system is installed in four separate divisions providing for the banquet hall and ball room, service floors, private dining rooms and toilet-room exhausts; the first mentioned is the largest, handling 50,000 cubic feet of air per minute. The banquet hall is located below the street level, and just above it is the ball room, the area of each being 50 by 90 feet, the height of the former being 20 feet and that of the latter 30 feet. The ventilating equipment for these rooms is located just above the ball room.

The air is drawn in by a fan. It passes first over a tempering coil which warms it above the freezing point of water and then through a washer which purifies it. It is then heated to the proper temperature by passing through a reheater and is sent through the ducts by which it is distributed. The tempering coils and reheater consist of radiator sections heated by steam which is controlled by a thermostat, so that the temperature of the air is always at the proper point.

In summer the air is cooled by means of direct-expansion cooling coils placed in the spray chamber of the air washer. Frost is prevented from forming on the outside of the pipes by a constant spray of water flowing over the coils.

The best possible ventilation is effected by utilizing the room registers at both the floor and ceiling levels. In the winter when warm air is brought in, it enters through the ceiling and exhausts through the floor registers. In the summer, however, this order is reversed and the cold air is brought in through the floor and the exhaust taken out through the ceiling registers.

The efficiency of this arrangement is due to the fact that the heated air introduced is at a higher temperature than that of the room and on entering

its temperature is reduced, so that the flow of air is downward, and the proper place to remove the foul air is at the floor level. On the other hand, when cold air is introduced at a lower temperature, it is heated on entering, produces an upward flow and the foul air goes out at the top. The reversal flow is obtained by means of a reversing damper.

The system is designed to change the air in each toilet room once every four minutes and in the other rooms once every six minutes. The accompanying illustration shows a battery of blowers mounted on the twelfth floor of the annex and furnishing the ventilation for the kitchen and toilet rooms, discharging to the atmosphere through a ventilator constructed of 24-ounce copper. The view shows all three blowers with their motors, the doors of the housing having been removed for photographic purposes.

The blowers throughout the building were furnished by the B. F. Sturtevant Company, of Hyde Park, Mass., and the motors by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

The motors are of the SK type, designed for operation at 240 volts direct current and are arranged for speed adjustment. Two of the motors shown are rated at 10 horsepower with a speed of from 236 to 260 revolutions per minute, and the other one at 12.5 horsepower with a speed of from 336 to 360 revolutions per minute. These motors represent the most advanced design in direct-current machines for adjustible-speed service and are specially adapted to driving blowers. Excellent commutation under all conditions of load is one of their strong features which is due both to the action of the commutating poles and the design and construction of the machines.

Electric Locomotive for the Spokane & Inland Empire Railroad.

A 50-ton standard-gauge Baldwin-Westinghouse electric locomotive suitable for yard service has recently been furnished the Spokane & Inland Empire Railroad Company for the Spokane yard.

Four Westinghouse No. 301-D-2 motors are geared with a ratio of 17 to 60 to 37.25-inch wheels. The nominal rating of the motor is 100 horsepower at 600 volts and 150 amperes. The motor is a box-frame commutating-pole machine. The motors are permanently connected two in parallel, the groups being connected in series and parallel with each other in conjunction with the necessary resistance to produce smooth acceleration. Westinghouse type HL electropneumatic control, which because of its heavy contact pressures and positive action is particularly adapted for handling the heavy currents encountered in locomotive operation, is used.

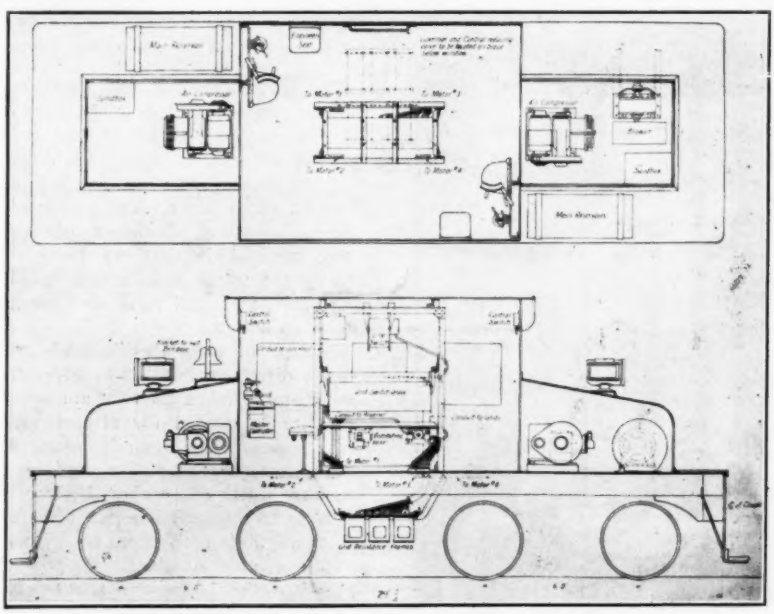
A double brake equipment is employed and air for the braking and control systems is supplied by two motor-driven compressors, each having a displacement capacity of approximately 35 cubic feet of free air per minute. A hand brake is provided for holding the engine when it is stored up in the yards.

The locomotive is designed to traverse curves of 34-foot radius when running without a trailing load. The trucks are of the equalized-pedestal type, with square frames, forged in one piece and rigid bolsters of cast steel. The pedestals are provided with removable shoes, which can easily be replaced when worn. The axles are of forged steel and the wheels are steel-tired with cast-steel spoke centers.

The cab is of steel and centrally located. It may be entered from either end. Large window openings give an unobstructed view in any direction. Controlling equipment is installed in duplicate, the locomotive being arranged for double-end operation. As is usual in a locomotive of this type, a sloping hood is placed at each end of the cab. These hoods can easily be opened to allow access to the equipment which they cover. The locomotive is furnished with one bell, two air whistles, and sand boxes at each end with pneumatic sanders.

Herewith is shown the equipment layout for the Inland Empire locomotive. In this illustration is shown the location of the control switch, master controller, line switch, reverser, switch

Fifty-Ton Electric Locomotive.



Plan and Section of Locomotive Showing Arrangement of Apparatus.

group and control resistance. This locomotive, being of the steeple-type cab, has practically all the control equipment located in the central part of the cab. The heavier parts of the control equipment, namely, the switch group, line switch and reverser, are mounted on a steel angle-iron frame which is fastened to the floor of the cab, and also to the roof of the cab.

One air compressor is mounted under one of the hoods of the cab, and under the other hood of the cab is mounted a second air compressor and blower. This motor-driven blower supplies air for ventilating the traction motors. The motors and auxiliary apparatus have sufficient capacity to enable the locomotive to exert continuously a normal tractive effort of 9,400 pounds with 600 volts at the motors. It will also exert a tractive effort of 16,000 pounds at approximately 9.2 miles per hour with 600 volts at the motors. With clear, dry rails it will be able to exert momentarily a maximum tractive effort of 25,000 pounds.

New Electric Water Sterilizer for Moderate Output.

Although it has been only within a recent date that the electric method for sterilizing water by the ultra-violet rays from the mercury-vapor lamp has been put into practice, experience with the new apparatus shows that excellent results are obtained by purifying water in this way. The process is not only an interesting one as applied on a large scale for municipal use, but is also likely to meet with a wide application in small sterilizers for domestic use or for small plants of various kinds. The new apparatus for small outputs, which is illustrated herewith, is the outcome of a long experience by a French company. As will be noticed, it consists of a simple tank of white-enameled metal through which the water flows and is subjected to the action of the ultra-violet rays from the lamp. In this case the water is not in contact with the lamp, which is placed at the top of the tank, but is made to flow very close to it, and a number of baffle plates in the lower half of the tank are disposed so as to produce a circulation of the water in a suitable way and make it pass several times under the influence of the rays, thus securing a long enough exposure to destroy all the microbes in the water, as has been found by actual experience. One superiority of the present method is that no taste is given to the water, and it retains all its natural gases and salts so that it is quite palatable.

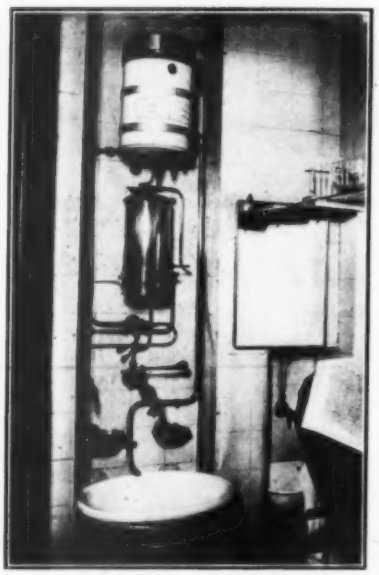


Fig. 1.—Sterilizer in Physician's Office.

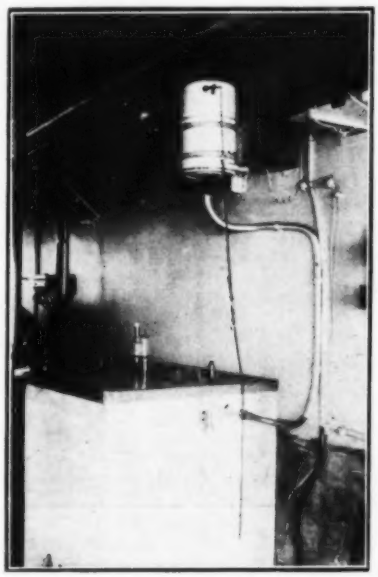


Fig. 2.—Sterilizer in Mineral-Water Plant.

This type of apparatus is made to work on direct-current 110 to 250-volt circuits, and it takes 3.5 to 4 amperes. A rectifier is needed for alternating-current mains. The tank is attached to the house water piping, and delivers pure water on turning the lower tap. Next to the tank is a small board with a regular resistance to adjust the voltage, also an alarm bell which rings when the lamp is not burning. A cord attached to a lever at the top serves to tilt the lamp. The output is about 130 gallons per hour, provided clear water is used to start with, as is usual in large towns.

This new sterilizer has only recently come into use, and we illustrate some of the first plants which have been installed in France. One of these, Fig. 1, is an apparatus fitted in the consulting room of a well-known Paris physician, who states that the sterilizer has always given complete satisfaction. Its compact arrangement will be noticed, despite that under the tank is a medical apparatus which would not be found in an ordinary domestic plant. Another sterilizer, Fig. 2, is fitted in the works of a mineral-water firm at Paris and is working very well. Fig. 3 shows an apparatus as applied in a large school in the same city, this being the Commercial College. This outfit sterilizes all the drinking water used in the school, which has about 200 to 220 students. Another one is now set up in the waiting room of the North Railroad Depot in Paris; this railroad company adopted it after a long series of competitive trials. It is now proceeding to adopt it for other railroad stations on the lines.

The present apparatus is designed on the Henri, Helbronner and De Recklinghausen system and manufactured by R. U. V. Societé Internationale Pour Les Applications Des Rayons Ultra-Violets, 73 Boulevard Haussmann, Paris, France.

Electrical Equipment for the Silesian Mountains Railway.

The Koenigliche Eisenbahndirektion, of Berlin, Germany, has ordered 44 locomotives for the electrification of the Government railway lines in the Silesian Mountains. Fourteen 1,600-horse-power express locomotives will be supplied by the Bergmann Elektricitäts Werke; 10 freight locomotives by Brown, Brown & Company; 20 freight locomotives by the Siemens-Schuckert Werke. The Allgemeine Elektricitäts Gesellschaft will supply the complete electrical equipment for five multiple-unit motor-car trains of three cars each, to be used on the branch lines.

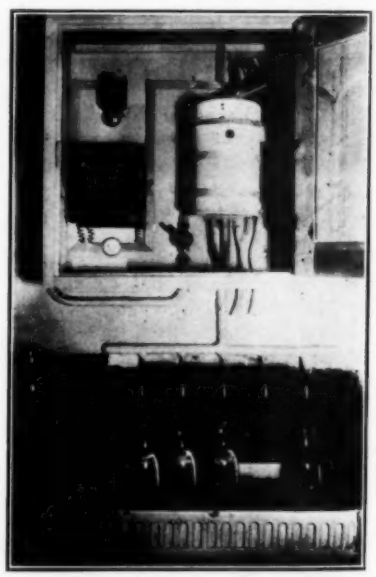


Fig. 3.—Sterilizer at Commercial College.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

LA FERIA, TEX.—The mayor of this city may be addressed regarding the contemplated construction of an electric lighting plant.

LAS VEGAS, N. M.—A new system of street illumination will be installed before January 1 by the Las Vegas Light & Power Company.

ARCADE, N. Y.—At a recent election it was decided to raise $9,000 with which to purchase an additional unit for the electric light plant.

KANE, ILL.—The Village Board has granted a 52-year franchise to the Central Illinois Public Service Company to operate an electric lighting system. Z.

STERLING, ILL.—The City Council is investigating the lighting system used in North Dixon, with a view to installing a similar system at this place. Z.

BROOKLYN, ILL.—The Village Board has granted a franchise to the Illinois Northern Utilities Company to operate an electric lighting system in Brooklyn. Z.

DECATUR, ALA.—It is considered probable that the "White Way" which is being installed in Decatur will be extended for several blocks later on.

HADDONFIELD, N. J.—Borough officials at Haddonfield are agitating the question of the establishment of a municipal electric-lighting plant and system.

ELWOOD, IND.—The Elwood Electric Light & Power Company is preparing to enlarge its plant, install some new machinery and materially enlarge its business. S.

MANASQUAN, N. J.—A committee composed of Councilman Moore, Thorp and Curtis has been appointed to ascertain the cost of a lighting plant for this borough.

FORT VILLE, IND.—The Town Board has granted a franchise to the Union Light & Power Company to supply the town with electricity and light the streets. S.

JOPLIN, MO.—A permit to operate in Texas has been granted to the Independent Power Company, of this place. The capital stock of the company is $400,000.

ANTIOCH, CAL.—The Great Western Power Company has applied for a franchise in this city and bids will be received up to January 13 for the sale of said franchise.

CHICOPEE, MASS.—The Board of Aldermen has granted the Warren Power Company permission to enter the city and erect poles for the maintenance of wires and other appurtenances.

ASSUMPTION, ILL.—The Central Illinois Public Service Company has quoted the city a rate of $25 per light per year for 82 incandescent lights. It is proposed to install cluster lights in the business section. Z.

OGDEN CITY, UTAH.—City Engineer H. J. Craven has filed on 100-second feet of water at the Cobble Creek dam site in South Fork for power purposes, and municipal electric lighting is proposed for this city.

TORONTO, ONT.—The Toronto Fower Company is preparing to invade New York State and enter into competition with the Ontario Power Company by building a power transmission line from Niagara Falls to Syracuse.

ABINGDON, ILL.—The City Council has granted a 30-year franchise to the Abingdon Electric Company to operate an electric light system in the city. A five-year contract has been made with the city for lighting the streets. Z.

SYRACUSE, N. Y.—The Public Service Commission has granted the Syracuse Lighting Company permission to issue $107,000 of its extension and improvement bonds. The proceeds are to be used for further gas and electric extensions.

WAVERLY, ILL.—The Central Illinois Public Service Company is said to be negotiating with H. J. Rodgers, of this city, for the sale of his electric light plant. A transmission line will be erected at Franklin to supply light and power to that city. Z.

DECATUR, ILL.—Peoples Co-Operative Light Company has been incorporated with a capital stock of $50,000 for the purpose of selling electricity. The incorporators are George W. Mueller, Frank L. Suffern and James D. Johnson.

EVANS MILLS, N. Y.—Frank W. Lawton, of this place, is, it is stated, contemplating the matter of locating a power plant at Slocumville, about two miles east of this place, and supplying electricity both to Evans Mills and Leraysville.

BERKELEY, CAL.—The City Council has under advisement the matter of installing a municipal electric lighting plant and is planning to employ one or more experts to prepare data as to local needs relative thereto. A bond election is to be held in January.

TOLEDO, O.—The Council Committee this week adopted plans for lighting the new Cherry Street bridge across the Maumee River. The bridge will be lighted by 58 arc lamps, 32 feet apart, at a yearly cost of $2,610. Each lamp will be on a handsome post set at the curb line. H.

HARRISBURG, PA.—Articles have been filed announcing the merger of the Monongahela Light Company and the Oakmont & Vernona Light, Heat & Power Company into the Duquesne Light Company, of Pittsburgh, with a total capital stock of $541,000. M. B. Starring, of New York City, is president of the company.

ROME, GA.—A committee composed of Aldermen Copeland, McDonald and Irwin has been appointed to investigate the feasibility of installing a municipal lighting plant in Rome, and it is expected that the erection of such a plant will be commenced shortly after the first of the year.

SPRINGFIELD, ILL.—The Springfield Light, Heat & Power Company has refused the offer of $10,000 for the ornamental lighting system on Fourth Street Boulevard, made by the City Commission. The city will have estimates made for a system to be installed and owned by the municipality. Z.

GLASGOW, KY.—A contract has been made here between the Glasgow Electric Light & Power Company and a New York firm for a new plant which will replace the electric machinery now in use and supply Glasgow with light and power for 24 hours. It is the aim of the company to have the system installed and in operation by January 1.

CHATTANOOGA, TENN.—A. W. Burke, president of the Chattanooga Retail Merchants' Association, of Chattanooga, Tenn., has announced that bids will be received in a short time for supplying and installing the ornamental street lighting equipment which is to be installed along Market Street, for a distance of several blocks, by the members of the Association. G.

MOUNT HOLLY, N. J.—It is reported that the Public Service Corporation, of Trenton, N. J., is planning to install alternating current in Mount Holly with the intention of furnishing day power for manufacturing and other purposes. The corporation has in view a new plant at Burlington, from which power will be transmitted to various places.

KENTON, O.—As a result of the court decision just handed down that the Hardin-Wyandotte Lighting Company, of this city, can not furnish power outside the city, it is probable that the towns of Forest and Dunkirk will erect municipal lighting plants in the near future. Both municipalities are cut off from lights which were heretofore furnished by the local power plant. H.

TERRE HAUTE, IND.—The Commissioners of Vigo County have granted the Terre Haute, Indianapolis & Eastern Traction Company a franchise to transmit electricity over all the public highways of the county. The especial purpose is to run the lines to the coal fields and supply the mines with electric light and power, and incidentally several towns alongside the route. S.

MULBERRY, IND.—Articles of incorporation have been filed with the Secretary of State by the Mulberry

Light & Power Company. The initial capital stock is $3,000, which will be increased later. The purpose of this corporation is to build, equip and operate an electric light and power plant. Martin S. Steekel, David H. Yund, Albert Weldner and Daniel Rex are the directors. S.

FALLS VILLAGE, CONN.—It is reported here that a big electric power plant is being planned to be built on the town's splendid water power, which will be capable of producing sufficient electric energy to not only supply local needs but also for sale for manufacturing purposes. It is also proposed to build an electric interurban railway between Litchfield, Winsted and Torrington and Falls Village.

FARMINGTON, ILL.—The People's Electric Service Company's electric light plants and distributing systems at Farmington, Fairview, London Mills, and Cuba have been sold to R. F. Wallace, of Peoria, Ill., secretary of the Peoria Gas and Electric Company. The new company will make extensions, including the building of lines to Trivoli and Hanna City, mapped out by the former owners, it is reported. Z.

SAN BERNARDINO, CAL.—The Pacific Power & Light Company, has, it is rumored, about completed its plans to build a 60,000-volt power line direct to this city from the big distributing station at Eagle Rock, Los Angeles County. It is understood that this line will form a loop of the Valley and it is proposed to extend it from this city southward to Colton, Riverside and thence westward to Dominguez, near San Pedro. ..

BOISE, IDAHO.—The Idaho Consolidated Power & Utilities Company has filed articles of incorporation under the laws of Delaware with a capital stock of $3,500,000. The incorporators are Simon Gross, Byron H. Hooper and Raphael Brill, all of New York City. It is said that the company has the backing of millions of dollars of Eastern money and that a gigantic electric light and power project is to be launched in Southern Idaho.

RACE TRACK, MONT.—It is understood that an appropriation of $80,000 will be asked of the legislature this winter for the completion of the State's hydroelectric power plant at this place. A five-mile canal was built a couple of years ago for the purpose of delivering the water into a reservoir just above the site selected for the generators. Engineers have passed upon the feasibility of the plan and declare it to be one of the best smaller developments in the West. The total water power development will be 1,000 horsepower.

ARTESIA, N. M.—The Artesia Light & Power Company is preparing to install additional machinery and equipment at a cost of more than $300,000. It will construct electrical transmission lines from its central power station here to farms of this section, and furnish power for operating many pumping plants. The company is also developing on its own account several hundred acres of land upon which it is boring wells and installing motors and pumps. Among the machinery to be installed in the power plant are two 450-horsepower Deisel engines. John C. Keys is president of the company. D.

SALT LAKE CITY, UTAH.—Fourteen of the largest power electric plants in Utah, Idaho and Colorado have been merged in a $40,000,000 corporation, which will supply railroads, mines, mills and smelters with power. Announcement has been made that the deeds completing the merger were signed in New York by the Electric Bond & Share Company. At the same time the articles of incorporation in Utah of the Utah Power & Light Company were amended to increase the capital stock from $1,000,000 to $40,000,000. D. C. Jackling, a prominent mine operator and banker, is president of the company.

WINCHESTER, KY.—It is understood that the Kentucky Utilities Company is planning the erection of one of the largest power plants ever constructed south of the Ohio River, from which Richmond, Mount Sterling, Owingsville, Sharpsburg, Paris, Clay City, North Middletown and Irvine will be supplied with electric energy. A franchise has been asked from the Clark Fiscal Court for the pole line to conduct the current to the adjoining counties and the money for that purpose has already been deposited with the proper authorities. The probable cost of the Winchester plant and branches will aggregate more than $1,000,000 and the corporation will be under the general direction of Harry Reid, of Versailles, the present general manager of the Insull interests in Kentucky.

CLINTON, MASS.—Chace & Harriman, of Boston, have taken over the largest water privilege on the Connecticut River, north of Vernon. The deal includes the purchase of the Bellows Falls Canal Company, organized in 1870 for power use, and the Fall Mountain Electric Light & Power Company, which controls the Bellows Falls (Vt.) electric lighting and power plant. Chace & Harriman also control the Connecticut River power plant at Vernon, which furnishes electricity for light and power in most of the larger towns within a radius of 50 miles. The understanding at present is that these plants will be connected and another plant located at McIndoes Falls. In addition to the water privilege, with dam, etc., the purchasing price of more than $1,000,000 includes several plots of ground and an auxiliary plant located on Saxtons River.

CARTHAGE, N. Y.—One phase of the village lighting question which is being discussed with a great deal of interest is the advisability of utilizing the water power owned by the village at the foot of Furnace Street for the generating of its own electricity for lighting the streets. The village owns 150 horsepower which was utilized for a long time in pumping the water from the Black River into the village water system. It is stated that the cost of developing this water power, including the equipping of an electric plant and furnishing wires, poles and all necessary equipment for a street lighting system, as well as installing the same, would be between $18,000 and $20,000. It has also been estimated that considerable more electricity would be generated than the village is now using, that much more light could be had and that the cost of upkeep after paying the interest on the investment would be considerably less than the yearly $3,200 which the village is now paying for its light.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

BLANCHARDVILLE, WIS.—Fayette-Blanchardville Telephone Company has been incorporated with a capital stock of $800 by P. J. Goebel and others.

TAMPA, FLA.—An ordinance has been passed granting the Bell Telephone Company permission to construct, maintain and operate a conduit system in Tampa.

NEW ORLEANS, LA.—The Cumberland Telephone & Telegraph Company will expend $300,000 in the early part of the coming year on additions to its present site here.

BOSTON, MASS.—The New England Telephone & Telegraph Company is planning to spend half a million dollars for the site and construction of a new Back Bay exchange.

CANTON, ILL.—The United Farmers' Telephone Company will expend $1,200 in rebuilding its cable line inside the city. The contract has been given to the telephone company. Z.

CROWLEY, LA.—The Cumberland Telephone & Telegraph Company plans to rebuild its pole lines and central at Rayne, and to rebuild the country line running east from Crowley.

PASADENA, CAL.—The Home Telephone Company has announced proposed improvements, which include the installation of about 100 miles of cable and the removal of all duplicate poles.

HILLSBORO, ILL.—The Village Board has granted a 50-year franchise to the People's Mutual Telephone Company to construct a telephone line through the village. The proposed line will extend from Hillsboro to Irving. Z.

SAN DIEGO, CAL.—The Pacific Telephone & Telegraph Company has begun laying a six-duct conduit from Seventh to Twenty-fifth Street, and when this work is completed will lay a four-duct conduit from University to El Canjon Avenue.

SALIDA, CAL.—A committee composed of Messrs. Cross, Kewin, Johnson, Hard, Beckwith, Law and Chapman has been appointed to have in charge a project which is under way for the improvement of the farmers' telephone lines leading into Modesto.

WORDEN, MONT.—The Farmers' Telephone Company of Worden has filed articles of incorporation with the Secretary of State with a capital of $10,000. This company will build its telephone system entirely in the rural districts. It is stated that construction work will be started at once.

DEKALB, ILL.—Benjamin Knappenberg, president of the Farmers' Union Telephone Company, which operates lines north of Kirkland and in Boone and Winnebago Counties, is negotiating for a franchise to build a line into DeKalb. The company is said to also be contemplating a franchise at Sycamore. Z.

RIVERDALE, CAL.—The Riverdale & Lanare Telephone Company has been incorporated with a capital stock of $700 for the purpose of maintaining a telephone line between Riverdale and Lanare, a distance of four miles. The directors are Alan Milnes and A. J. VanCleef, of Riverdale, and L. A. Nares, of Fresno.

ELECTRIC RAILWAYS

(Special Correspondence.)

SAN FRANCISCO, CAL.—It is believed that trolley extensions will be made in the Mission District by the United Railroads.

WATERVILLE, ME.—The Public Utilities Committee is considering the construction of an electric road from Farmington to this place, by way of Farmington Falls, Chesterville, New Sharon, Mercer and Fairfield Center.

CARTHAGE, N. Y.—It is reported here that the Watertown Light & Power Company is preparing to construct a trolley line between Carthage and Watertown, to include the interurban stations between the two places.

GLOBE, ARIZ.—Right of way has been granted to Nathan L. Amster, of Boston, Mass., for an electric street railway from the town of Globe to and through the town of Miami to Live Oak.

TOWANDA, PA.—A. C. Smith, a prominent citizen of this town, is said to be behind a project to establish a trackless trolley line in Towanda, and it is expected that the system will be in operation by spring.

JAMAICA, N. Y.—The Public Service Commission has authorized the building of a trolley line from Jamaica to Manhattan by the Manhattan & Queens Traction Company. It is expected that the road will be finished by next May.

NASHVILLE, TENN.—A charter has been granted to the Chattanooga & Chickamauga Interurban Company, capitalized at $25,000. The incorporators are W. E. Borleau, E. D. Reed, D. S. Hohn, Frank Spurlock and T. G. Newman.

OMRO, WIS.—There is a report in circulation that the Wisconsin Electric Railway Company, which operates the Oshkosh-Omro Interurban line, has been successful in the financing of the project of extending this interurban to Berlin, and that the road will be built soon.

RICHMOND, CAL.—The Southern Pacific Railway Company has accepted the revised draft of the franchise asked for some time ago, included in which is the illumination of the business streets over which the new interurban electric lines will run. Passenger traffic over the first division will commence early in the spring.

PATERSON, N. J.—It is reported here that the New York & New Jersey Railway Company will in the near future start operations for the building of an electric railway between Paterson and Hoboken. The report is that London (England) capitalists have been induced to finance the road, which will be one similar to the New York elevated.

MATTOON, ILL.—The City Council has granted a franchise to the Decatur, Sullivan & Mattoon Transit Company to lay tracks and operate interurban trains over Edgar Street, Third Avenue, Fifteenth Street, Dewitt Avenue, Thirty-Third Street, Twentieth Street and Western Avenue. The line must be in operation within three years. Z.

HONESDALE, PA.—The Wayne County Street Railway Company has been organized by M. B. Allen, E. B. Hardenbergh, W. J. Ward, F. W. Powell, G. W. Sell, J. S. Brown, L. Blumenthal, R. J. Murray, C. P. Searle and others. It is understood that the company will commence work on the construction of the intended road as soon after January 1 as possible, and it will be about 12 miles in length.

BOISE, IDAHO.—There are numerous plans for improvements to the property of the Southern Idaho Light & Power Company and the Idaho Traction Company. R. W. Watson, of New York, managing director and one of the capitalists heavily interested in the enterprises, has had submitted to him plans for several proposed new power and electric lines.

DENISON, TEX.—The Eastern Texas Traction Company, which has been working for some time on the proposition of constructing an interurban electric railway between Dallas and Greenville, has extended its plans to make Bonham the northern terminus of the road. It will run from Bonham to Greenville via Wolfe City. Joseph F. Nichols, of Greenville, J. W. Crotty and Paul Miller, of Dallas, representing the company, have taken the matter up with the people of Bonham and Wolfe City and have obtained a right of way guarantee from the Hunt county line to Bonham. It is reported that if proper encouragement is given the line may be continued northwest from Bonham to Denison.

WINNIFEG, CAN.—An electric railway, with lines stretching from Winnipeg to Quebec and with seven points of contact with the great steam railways of the country, is the future outlined for the Porcupine Rand Belt Electric Railway Company. The company has already been granted a charter permitting the construction and operation of 500 miles of railway in Ontario and has applied for charters to allow construction of joining pieces of the line in Quebec and Manitoba. This winter the first 75 miles of the road are to be surveyed by eight parties. This is to form the nucleus of the greatest conception of electric transport yet brought within striking distance of achieved fact in Canada. Within the provisions of their Ontario charter the company has already power to build the largest single section of the great new scheme. They are now entitled and intend to construct a line from Larder City east to the Quebec boundary, only a few miles distant. This will stretch west to Nipigon Bay, giving a deep water harbor on Lake Superior and coming in on the benefits of the proposed Dominion Government projects. From there the line will run west to the Manitoba border to meet the construction east from Winnipeg to be covered by the charter now applied for in the western province. On the east and covered by the Quebec charter will be a line running from the border, 150 miles, to a point on the Grand Trunk Pacific system, and midway from this section a line will run southeast to Mont Laurier, connecting there with the Canadian Facific Railway to Montreal. A still further projection will run northeast to Quebec City, passing close to Three Rivers. Thus an electric railway will run from Quebec to Winnipeg with lines running through a country not served by any of the three great transcontinental steam railways, but with connections with all of them at least at one point.

PROPOSALS.

ELECTRIC LIGHTING PLANT.—Sealed proposals will be received by S. R. McKinney, secretary, Nacogdoches, Tex., until January 15 for the construction of an electric lighting plant to cost $20,000.

WIRING AND INSTALLING POWER PLANT.—Sealed proposals will be received by M. J. Fish, superintendent of buildings, Boston, Mass., until December 23 for the construction, wiring and installation of a power plant in the City Hall Annex.

LIGHTING PLANT AND ELECTRICAL EQUIPMENT OF PUMP.—Sealed proposals will be received by W. J. Dunn, chairman, Camden, S. C., until December 19 for the construction complete of lighting plant and electrical equipment of pump.

ELECTRICAL CONDUIT AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until January 17 for the electric conduit and wiring and interior lighting fixtures of a three-story building for the post office at Salina, Kans.; until January 18 of a one-story building for the post office at Ottawa, Kans. Drawings and specifications may be obtained from the custodian of each site or from the office of the Supervising Architect.

NEW INCORPORATIONS.

WILMINGTON, DEL.—William J. Maloney has taken out a charter for the Electric Furnace Company, which has a capital stock of $1,000,000. N.

PHILADELPHIA, PA.—Samuel S. Eveland has incorporated a company for the manufacture of electrical appliances for use on automobiles and has leased the four-story building at 2324 Market Street.

CHICAGO, ILL.—The Electric Vehicle Maintenance Company has been incorporated with a capital stock of $2,500 to repair electric vehicles. The incorporators are William Knobloch, William C. Russell and H. A. Tarantores. Z.

HAZELTON, PA.—The Butler, Delano, East Union, Mahoney, Union, West Mahoney, Conyngham, Carmel and Coal Electric Companies have filed articles of incorporation, each with a capital stock of $5,000 and headquarters in this city.

LITCHFIELD, CONN.—The Trumbull-Vanderpool Electric Manufacturing Company has been incorporated with a capital stock of $50,000. This concern is headed by George R. Trumbull, who recently purchased the Empire Electric Company, of Plainville.

NEW YORK, N. Y.—Continental Electric & Manufacturing Company, Incorporated, has been granted articles of incorporation with a capital stock of $10,000. The incorporators are Ida Cohn, Samuel Finkelstein and Eugene Fisk, all of New York City.

CHICAGO, ILL.—The Starrett Electric Company has been incorporated with a capital stock of $20,000 to manufacture and deal in electrical and mechanical appliances. The incorporators are Henry F. Starrett, Austin H. Martin and William J. Candlish. Z.

NEW YORK, N. Y.—The United States Cloth Cutting Machine Company, Incorporated, has been granted a charter with a capital stock of $5,000 for the purpose of manufacturing electrical cloth-cutting machines. The incorporators are David Perlman, Martin Zawistosski and Nicholas Komow, this city.

FINANCIAL NOTES.

The reappraisal of many stocks, principally certain industrial shares that have been carried at a high value for some time as securities for loans, under the impetus of careful examination on the part of lending companies, has caused considerable liquidation. This in turn has released a fair amount of capital, and money rates in consequence have been easier.

The Kentucky Utilities Company has filed a trust bond of $5,000,000 in the County Clerk's office at Elizabethtown, Ky., executed in favor of the Illinois Trust & Savings Bank, of Chicago. The mortgage covers the electric light and power plants and waterworks of Versailles, Mt. Sterling, Shelbyville, Somerset, Winchester and Elizabethtown, all of these properties having been recently acquired by the Kentucky Utilities Company. Persistent rumors are circulating to the effect that the Kentucky Utilities Company will erect a $1,000,000 power plant at Winchester, Ky., serving several cities in the eastern part of the state and also furnishing current for electric railways in that city. Color is lent to this rumor by the knowledge that the holding corporation is to bid for electric light and power franchises in Eminence, New Castle and Pleasureville, Ky., in the near future.

The Massachusetts Railroad Commission has approved an issue of $4,000,000 30-year bonds by Boston Elevated, bearing interest at a rate not exceeding 5 per cent and an issue of 40,000 shares of additional stock at $105 per share.

The American Public Utilities Company, through a syndicate of brokers, is offering $2,200,000 six-per-cent preferred and $770,000 common stock. The stocks will be offered in blocks of $1,000 par value preferred and $350 par value common for $1,000 in cash.

A special meeting of the stockholders of the Electrical Securities Corporation has been called for December 20 to vote on a proposed increase of the capital stock of the company from $3,000,000 to $3,500,000. It is planned to distribute the $500,000 new common stock as a special dividend to stockholders.

Gross receipts of Interborough Rapid Transit for November made a gain of $128,000, which compares with the phenomenal record of a $225,000 increase in October and a nominal gain of $74,000 in September. For the five months gross has increased a total of $798,000, or at the rate of slightly better than $1,900,000 per annum.

Harris, Forbes & Company, The National City Bank and Perry, Coffin & Burr, New York City, have purchased, and are offering to investors, a block of $1,000,000 first-mortgage five-per-cent gold bonds of the Southern Power Company. This company provides with electric power and light the great southern cotton mill district of North and South Carolina, reaching a population of over 600,000, and serving more than 148 mills. The bonds are secured by a first and only mortgage on the property, which reported earnings for the past year of over five times the annual bond interest charges.

Utah Power & Light Company has increased its capital stock from $1,000,000 to $40,000,000 and fourteen of the largest water power electric plants in Utah, Idaho, and Colorado, including the Telluride Power Company are merged therein. D. C. Jackling will be president. Headquarters will be maintained at Salt Lake City. Among the companies included in the merger are the Telluride Power Company, Ames & Ilium Hydroelectric Plant, Durango Gas & Electric Company, all in Colorado, the Grace plant, in Bannock County, Idaho, and the Knight Consolidated Power Company, of Utah.

Henry L. Doherty & Company have purchased from E. W. Clark & Company, Philadelphia, the majority of the $3,500,000 common stock of St. Joseph (Mo.) Railway, Light, Heat & Power Company, at $60 a share. The same terms are offered to minority stockholders depositing their stock with E. W. Clark & Company. The property will be taken over by H. L. Doherty & Company, as of February 1, 1913. The company operates the street railways, lighting, heating and power business of St. Joseph. It has $1,560,000 five-per-cent preferred, $3,500,000 common stock and $4,716,000 first-mortgage bonds.

The United Railroads of San Francisco have sold to E. H. Rollins & Sons, subject to approval by the California State Railroad Commission, $2,350,000 six-per-cent five-year notes. The proceeds from the new issue, together with money now in the sinking fund, will be used to pay off $3,000,000 Market Street Cable six-per-cent and $350,000 Park & Cliff House six-per-cent bonds which mature on January 1 next. The notes are dated November 1, 1912, and mature $150,000, November 1, 1914; $125,000, November 1, 1915; $125,000 November 1, 1916, and $1,950,000 November 1, 1917. They are secured by $2,150,000 Market Street Railroad 5s, and $975,000 San Francisco Electric first 5s.

Dividends.

Baltimore Electric Company; regular semi-annual of 2.5 per cent on the preferred stock, payable January 2, to stock of record of December 20.

Consolidated Gas, Electric & Power of Baltimore; the regular quarterly dividend of 1.25 per cent on its common stock, payable January 2 to stock of record of December 20.

Fonda, Johnstown & Gloversville Railroad; a quarterly dividend of 1.5 per cent, payable December 16 to stock of record December 5.

Interborough Rapid Transit Company has declared the regular quarterly dividend of 2.5 per cent, payable January 2 to stock of record December 24.

Manhattan Railway Company; regular quarterly dividend of 1.75 per cent, payable January 2 to stock of record December 16.

Manilla Electric Railroad & Lighting Corporation; a dividend of 1.5 per cent; also, an extra dividend of one per cent, both payable December 31 to stock of record December 18.

Providence Telephone Company; a quarterly dividend of $1 per share, payable January 1 to stock of record December 20.

Shawinigan Water & Power Company; a quarterly dividend of 1.5 per cent, payable January 20 to stock of record January 7.

St. Joseph Railway, Light, Heat & Power Company; regular quarterly dividend of 1.25 per cent on the preferred stock, payable January 2 to stock of record December 14.

Toronto Railway Company; a quarterly dividend of two per cent, payable January 2 to stock of record of December 16.

Twin City Rapid Transit Company; the regular quarterly dividends of 1.5 per cent on the common and 1.75 per cent on the preferred stock, payable January 2 to stock of record December 16.

United Light & Railway Company; the regular quarterly dividends of 1.5 per cent on the first preferred and three-quarters of one per cent on the second preferred stock, payable December 31 to stock of record December 21.

United Traction & Electric Company; a quarterly dividend of 1.25 per cent, payable January 2 to stock of record December 10.

Washington Water Power Company; a quarterly dividend of two per cent, payable January 2 to stock of record December 16.

West Penn Traction & Water Power Company; a quarterly preferred dividend of 1.75 per cent, payable December 16 to stock of record December 9.

Virginia Railway & Power Company; the regular semi-annual dividend of 2.5 per cent on the preferred stock, payable January 10 to stock of record December 14.

Reports of Earnings.

REPUBLIC RAILWAY & LIGHT COMPANY.

The Republic Railway & Light Company for October, 1912, and the twelve months ended October 31, 1912, reports consolidated earnings of its subsidiary companies as follows:

	1912	1911
October gross	$ 230,773	$ 200,864
October net	93,102	79,054
October surplus	49,159	34,630
Twelve months' gross	2,594,216	2,352,967
Twelve months' net	1,032,130	946,639
Surplus	503,489	421,411

Earnings of Pennsylvania Power Company are included in above statement for both years from March 1, only. Surplus earnings of Republic Railway & Light for 12 months ended October 31, 1912, were equal to 9.39 per cent on the outstanding preferred stock and to 2.76 per cent on the outstanding common stock after providing for preferred dividends.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Dec. 9.	Dec. 2.
American Tel. & Tel. (New York)	139	142¼
Commonwealth Edison (Chicago)	143	143⅝
Edison Electric Illuminating (Boston)	280	284½
Electric Company of America (Philadelphia	*12¼	*12¼
Electric Storage Battery common (Philadelphia)	54	54
Electric Storage Battery preferred (Philadelphia)	54	54
General Electric (New York)	184	186
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	1¾	1¾
Massachusetts Electric common (Boston)	16½	18½
Massachusetts Electric preferred (Boston)	74¼	77
National Carbon common (Chicago)	120	120
National Carbon preferred (Chicago)	117½	117½
New England Telephone (Boston)	153	153
Philadelphia Electric (Philadelphia)	23⅛	23⅝
Postal Telegraph and Cables common (New York)	84	85
Postal Telegraph and Cables preferred (New York)	67½	67½
Western Union (New York)	75	78¼
Westinghouse common (New York)	79½	83
Westinghouse preferred (New York)	*122	*122

*Last price quoted.

ST. JOSEPH RAILWAY.

The report of the St. Joseph (Mo.) Railway, Light, Heat & Power Company for the year ended October 31, 1912, shows net earnings of $543,889, an increase of $67,934. The income account compares as follows:

	1912.	Increase
Gross earnings	$1,164,156	$77,157
Operating expenses	620,266	9,224
Net earnings	543,889	67,934
Bond, interest and taxes	288,905	4,885
Surplus	254,984	63,049

The earnings for the common stock for the year ended October 31, 1912, after payment of dividends on $1,560,000 five-per-cent preferred, were $176,984, or more than five per cent on the outstanding $3,500,000 of common stock.

MONONGAHELA VALLEY TRACTION.

Monongahela Valley Traction Company reports earnings for October, 1912, and the ten months ended October 31, 1912, as follows:

	1912	1911
October gross	$ 77,837	$ 67,969
October net	48,248	42,371
October surplus	23,510	24,886
Ten months gross	705,450	611,638
Ten months net	425,111	397,202
Ten mos. surplus	213,555	233,539

The decrease in net surplus for the month and for the ten months was caused by an increase in fixed charges, taxes, and insurance for October, 1912, over October, 1911, of $7,253; and for the ten months ended October 31, 1912, over the ten months ended October 31, 1911 of $47,893.

LONDON UNDERGROUND RAILWAY.

The associated companies of the Underground Electric Railway Company of London report for the month of October, compared as follows:

	1912	1911
Metropolitan District Railway:		
Gross receipts	£69,840	£64,202
Expenses	32,843	29,249
Net receipts	36,997	34,953
London Electric Railway Co.:		
Gross receipts	£67,301	£65,696
Expenses	34,174	32,715
Net receipts	33,127	32,981
London United Tramways, Ltd.:		
Gross receipts	£26,181	£26,252
Expenses	18,724	18,271
Net receipts	7,457	7,981

MASSACHUSETTS ELECTRIC COMPANIES.

The report of the Massachusetts Electric Companies for the year ended June 30, 1912, shows net earnings of $3,309,792, against $3,324,217 in 1911. The income account compares as follows:

	1912.	*1911
Gross earnings	$9,116,202	$8,881,520
Expenses	5,806,410	5,557,303
Net earnings	$3,309,792	$3,324,217
Charges	1,840,328	1,838,579
Balance	$1,469,463	$1,485,637
Dividends	1,077,681	1,169,090
Surplus	$ 391,782	$ 316,547

* Year ended September 30.

GREAT WESTERN POWER COMPANY.

In a report to the executive committee of the Great Western Power Company, A. W. Bullard, vice-president, gives the following results of operations for the period Jan. 1, 1912, to Oct. 31, 1912:

	1912	1911
Gross earnings	$1,868,802	$1,592,969
Consumers connect.	10,728	4,258
Connected load, h. p.	120,500	94,892
Current gen., kw	240,271,071	167,818,328

These figures show an increase of 17.31 per cent in gross earnings, 152 per cent in number of consumers, 27 per cent in connected load and 43 per cent in current generated for the ten months ended October 31, 1912, as compared with the ten months ended October 31, 1911.

PERSONAL MENTION.

S. B. SEVERSON has been appointed manager for the Citizens' Gas, Electric & Heating Company at Mt. Vernon, Ill., succeeding F. M. Sinsabaugh.

R. W. DAGGETT, JR., has resigned as manager of the properties of the Wisconsin Telephone Company at Madison, Wis., to engage in the furniture business.

L. H. MEAKER, manager of the St. Louis Branch of Manning Maxwell & Moore, Incorporated, has resigned his position and will be connected in a similar capacity with the Ferro Machine & Foundry Company, Cleveland, O., after January 1.

VICTOR H. TOUSLEY, chief electrical inspector of the city of Chicago, delivered an address before the Cosmopolitan Branch of the National Electric Light Association at the Kuntz-Remmler Restaurant on Friday, December 13. Mr. Tousley's subject was "Electrical Inspection."

H. W. KARSTENS, electrical expert, delivered an illustrated lecture on "Electrical Illumination" to the merchants at Scranton, Pa., on December 6 upon the invitation of the Scranton Electric Company. Mr. Karstens gave practical demonstrations of the best method of illuminating stores and show windows.

WILLIAM H. ATKINS, who has just completed twenty-five years of service with the Edison Electric Illuminating Company, of Boston, Mass., of which he is now general superintendent, received congratulations from Thomas A. Edison by means of a disk phonograph record. Mr. Atkins joined the Edison Company in 1887 as an inspector. On November 1, 1897, he was appointed general superintendent.

HENRY W. POPE, secretary and treasurer of the Telephone Pioneers of America, announces that the office of the secretary has been removed to larger quarters at No. 30 Church Street, at which place the secretary will be glad to receive any Telephone Pioneers visiting New York City. Mr. Pope also states that the group pictures of the members in attendance at the second annual meeting at the Hotel Astor, New York City, are now ready and can be had direct from the secretary or from the photographer.

J. P. MOORE, formerly of the Wyandotte Construction Company, Kansas City, Mo., has accepted a position with the engineering department of the Westinghouse Electric and Manufacturing Company and will be engaged in railway electrification work. Mr. Moore has had a wide experience in railway construction work, having been engaged for some time past in the construction of the 70-mile, 1,200-volt direct-current line of the Kansas City, Clay County & St. Joseph Railway. For five years he was connected with the General Electric Company in general engineering work and subsequently with the Pacific Light and Power Company as resident engineer, and with the Des Moines Edison Light Company as superintendent of distribution, having charge of extensive improvements for these companies. He has also done considerable work for a number of tranction companies in the Middle West. He was instructor in electric railway engineering at State College, Pa., and while there contributed quite extensively to technical journals.

OBITUARY.

GEORGE A. KIMBALL, chief engineer of elevated and subway construction for the Boston Elevated Railway Company, died at his home in Arlington, Mass., on December 3, at the age of 62 years. Mr. Kimball was born in Littleton, Mass., was educated in Appleton Academy, New Hampshire, and then studied engineering. In 1876 he was city engineer of Somerville, Mass., serving until 1886. He was a member of the Mystic Water Board and of the Metropolitan Sewerage Commission from 1896 until 1901. Meanwhile he was consulting and constructing engineer for the West End Street Railway, Boston, and from that position rose to the place of great responsibility which he held at his death. Much of the subway and overhead portion of the transportation system of Boston was designed and constructed under Mr. Kimball's supervision. The Cambridge subway and the Elevated extension to Cambridge including a bridge over the Charles River, were the most recent works that had been in his care. In collaboration with engineers of the Boston Transit Commission, Mr. Kimball had helped to design the East Boston tunnel, the Washington Street tunnel and the Tremont Street Subway, which are leased to the Boston Elevated. Mr. Kimball was regarded as a high authority on construction work, and was a man of great executive ability. He was a member of the Arlington Congregational Church, the Masons, Knights of Honor, Royal Arcanum, Winchester Country Club, New England Street Railway Club, and was a director of the Arlington Co-operative Bank.

FOREIGN TRADE OPPORTUNITIES.

(*Parties interested in the following items should address the Bureau of Manufactures, Washington, D. C., and refer to the file number noted.*)

NO. 10,026. STANDARDS AND POLES.—Tenders will be received until January 6 at the Public Works Office, Wellington, New Zealand, for the supply and delivery of 1,700 steel standards and 500 steel poles for the Lake Coleridge hydroelectric power scheme. Copies of the drawings, specifications, and forms of tender may be obtained from the above address.

NO. 10,031. HEATING AND ELECTRICAL APPARATUS, MACHINERY, AND MOTORS.—An American consular officer in the Levant has forwarded a communication from a business firm in his district expressing a desire to hear from American manufacturers of heating apparatus, electrical supplies, machinery, and industrial motors. Correspondence is also desired with firms interested in securing contracts for both public and private works.

NO. 10,033. TRAMWAY LINE.—An American consul reports that a city in Italy has for some time been making investigations relative to the construction of an electric tram line having a total length of 28 miles. The estimates, amounting to $521,000, were recently submitted to the investigating committee by the engineer appointed to make a report on the project. The equipment needed will include rails, trolley wire, pole brackets and accessories, telephone line, trolley cars, lighting plant, machinery, etc. Interested persons should communicate with a person named in the report and correspondence should be in Italian.

DATES AHEAD.

Oregon Electrical Contractors' Association. Annual convention, Portland, Ore., December 17-18.

American Association for Advancement of Science and affiliated societies. Annual meeting, Cleveland, O., December 30-January 4, 1913.

Northwestern Cedarmen's Association. Annual meeting, Duluth, Minn., January 7-8, 1913.

South Dakota Independent Telephone Association. Sioux City, S. D., January 8-9, 1913.

Illinois Electrical Contractors' Association. Annual meeting, Peoria, Ill., January 17-18, 1913.

Peoria Electrical Show. Peoria, Ill., January 18-25, 1913.

Ohio Engineers' Society. Columbus, O., January 21, 1913.

Electrical Contractors' Association of New York State. Annual meeting, Syracuse, N. Y., January 21, 1913.

Western Association of Electrical Inspectors. Annual meeting, St. Louis, Mo., January 28-30, 1913.

National District Heating Association. Fifth annual convention, Indianapolis, Ind., May 27-29, 1913.

NEW PUBLICATIONS.

MICHIGAN SECTION PROCEEDINGS.—The proceedings of the first convention of the Michigan Section, National Electric Light Association, have appeared in a bound volume of 116 pages with illustrations. The minutes of the meeting and the papers and discussions presented at the convention are included. This convention was held on the steamship *Majestic*, June 21 to 25.

With the Electrical Manufacturers

The Century Electric Company, St. Louis, maker of the well-known "Century" single-phase motors, has done more business this year than in any year since it began the manufacture of motors. The company is particularly proud of the foreign demand for its product.

The Delta-Star Electric Company, Chicago, Ill., is distributing a new 32-page data bulletin devoted to high-tension distribution. The data given on 33,000-volt line construction, method of lightning protection, etc., will be of interest to operators of high-tension systems.

Duncan Electric Manufacturing Company, Lafayette, Ind., has prepared a large chart in which are pictured some ten of its different types of switchboard, house and portable watt-hour meters. The company has also issued a circular calling particular attention to its model R switchboard meter.

The Morriseff Electric Manufacturing Company, 82 Walker Street, New York, has published some new descriptive matter relating to the "Nosplice" connector. This connector reduces the time of making up connections, is approved by the Underwriters and is rapidly gaining in popularity.

National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, in a recent bulletin comments on semi-indirect lighting and shows a composite or multiple fixture in which about the edge there is a group of lamps equipped with reflectors for indirect lighting and the center of the bowl is illuminated to give a semi-indirect effect.

R. M. Laird, manufacturers' agent, Minneapolis, Minn., reports great activity in the moving of household appliances. He is averaging six Thor laundry machines a week. He is also busy on commercial illumination, doing a great deal of work in factories and stores. These two lines have increased more than 100 per cent in the last 60 days.

Dossert & Company, 42 West Forty-first Street, New York, N. Y., has issued a reprint of an article that appeared recently in *The Signal Engineer,* and which deals with the use of Dossert connectors in signal work on the Pennsylvania Railroad system. Particular mention is made of the wiring of 3,300-volt transformers, in which these connectors are liberally employed.

Reynolds Electric Flasher Manufacturing Company, 617 West Jackson Street, Chicago, has issued bulletin No. 24, in which is described the new Reco cabinet-type flasher. This flasher is entirely incased in a cast-iron cabinet and is designed for flashing on and off the whole or alternate sides of small signs; the flasher is also adapted for obtaining two, three or four-color effects in transparencies, lens signs, show-window displays and for a variety of other uses. These flashers can be readily attached to electric signs already installed.

Kuhlman Electric Company, Elkhart, Ind., has issued catalog No. 27, which describes a large variety of lighting and power transformers manufactured by this company. The catalog is illustrated with many sectional diagrams and views of the transformers in various stages of construction, particularly of the three-phase type. Along with the standard types of transformers mention is also made of sign-lighting, wireless-telegraph, pipe-thawing and arc-lamp transformers. Complete data are given of the standard 2,200-volt transformers.

The National Carbon Company, Cleveland, O., has received from S. F. Kelting, Mineola, N. Y., the following telegram: "It may interest you to know that the first aeroplane wired for electric light, current furnished for same from Columbia No. 6 ignitors, made a number of successful flights tonight at Hempstead Plains aviation field—(George W. E. Beatty, aviator in Wright machine). I used 12 Christmas-tree lamps, 1.5 volts, and several colors; used 30 batteries, three sets, ten in series. Fine results."

General Electric Company has issued through its Edison Lamp Department, Harrison, N. J., an attractive booklet entitled "Electricity in Our House." This describes a visit to an electrified home and is illustrated with numerous views of handsome electric-lighting fixtures employing Mazda lamps, a variety of electric heating devices and a small sewing-machine motor. The booklet calls attention forcibly to the great convenience of the use of electricity in the home and to the great variety of purposes to which it may be effectively applied.

J. G. White & Company, Incorporated, New York, N. Y., has received telegraphic advice of the award to its London associated company (J. G. White & Company, Limited) of a contract for railroad construction in the Argentine Republic which will amount to about $4,000,000. This new contract, like others that have been executed for the same clients, is on the usual basis of cost plus a fixed fee. The railroad to be constructed constitutes a connecting link in the through system between the terminals Beunos Aires, Argentine, and Rio de Janeiro, Brazil.

The Ruemmeli-Dawley Manufacturing Company, St. Louis, Mo., has issued a new catalog of its ice-making and refrigerating machinery. This company has one of the largest factories engaged in the manufacture of this type of machinery. The catalog shows many views in various departments of this factory. Many views are given of ammonia compressors, condensers and other auxiliaries of an ice-making or refrigerating plant, also views of typical plants. Full data are given of the compressor units and a large list of installations is given at the close of the catalog.

Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, has issued several new publications, among which is one that describes electromagnetic safety brake for power-transmission shafting and other machinery. Another bulletin describes single-phase and poly-phase motors of the type D; included in this series are motors with squirrel-cage, slip-ring and cascade-connected construction. A third bulletin describes direct-current motors of the type HN. These are built in sizes from 3.5 to 100 horsepower and are employed for a variety of purposes such as machine-shop driving, for the operation of ventilators, blowers, pumps, etc.

William McLean & Company, electrical engineers and contractors, merchants and importers, 115 Elizabeth Street, Melbourne, Australia, announces that its representative, O. L. Remington, will be in the United States during December and again after returning from Europe about the middle of February. He will make his headquarters in the United States at the Auditorium Hotel, Chicago. This company is one of the largest wholesale distributing electrical jobbing houses in Australia. It has handled a number of American manufacturers' lines to advantage.

Holophane Works of General Electric Company, Cleveland, O., has issued a booklet devoted to new developments in artistic illuminating glassware. Mention is made of some 75 recent additions to the Fostoria lines of artistic glassware, which cover a wide range of applications. Among these are hexagonal shades with cut or etched designs for shower fixtures, artistic globes for hanging units, Veluria portable lamps, novel etched shades for chandeliers and brackets and Veluria hanging bowls for semi-indirect lighting. The elegance and grace of these designs have been successfully developed to meet the most advanced tendencies in lighting glassware and to satisfy the most critical architects and fixture dealers. The booklet is very attractively made up.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., reports the following among orders recently received: Charleston Traction Company, Charleston, W. Va., for two 300-kilowatt, 60-cycle rotary converters, six 110-kilowatt, 6,600-volt transformers and two switchboards for the main station and substation to be used in connection with the above; Eastern Pennsylvania Railways Company, Tamaqua, Pa., one 500-kilowatt, 25-cycle, commutating-pole rotary converter, three 185-kilowatt, 11,000-volt transformers and one switchboard for same; Edison Electric Illuminating Company, Brooklyn, N. Y., one 1,000-kilowatt, 25-cycle rotary converter, three 367-kilowatt, 6,600-volt air-blast transformers and one switchboard for same; Kankakee & Urbana Traction Company, Urbana, Ill., one 300-kilowatt rotary converter and three 110-kilowatt, 3,300-volt transformers and one switchboard; Power Construction Company, Shelburne Falls, Mass., nine 300-kilowatt rotary converters, two 2,000-kilowatt commutating-pole rotary converters, twelve 110-kilowatt, 13,200-volt transformers, six 700-kilowatt, 13,200-volt air-blast transformers, and five complete substation switchboards; these transformers have a frequency of 25 cycles, whereas the rotary converters have a frequency of 60 cycles; the transformers are designed for operation on both frequencies but for the present will be operated on the higher frequency, and eventually will be used on the lower frequency; five substations will be fully equipped.

Record of Electrical Patents.

Issued by the United States Patent Office, December 3, 1912.

1,045,809. Hanger for Trolley Wires. O. W. Brenizer, assignor to Bonita Manufacturing Co., Camden, N. J. The wire jaws are spring-pressed together.

1,045,818. Suspension Device for Dynamo-Electric Machines. A. H. Darker, assignor to J. Stone & Co., Deptford, England. An adjustable mounting for axle-driven car-lighting machines.

1,045,820. Telephone Meter. G. Deakin, assignor of one-half to McMeen & Miller, Chicago, Ill. The counting mechanism is actuated by a pivoted armature controlled by two electromagnet cores.

1,045,822. Process of Making Battery Plates. E. G. Dodge, South Orange, N. J. Copper oxide is applied to a backing and then fired to harden it and fuse it to the backing.

1,045,823. Battery Plate. E. G. Dodge, Newark, N. J. Has compressed copper oxide fused to the backing.

1,045,844. Elevator. H. G. Hillman, assignor to J. T. Clarke, New York, N. Y. Has electromagnetic clutch mechanism to prevent movement of the controller as long as the landing door is open.

1,045,845. Telephone System. E. R. Hobbs, Buhl, Ida. A busy test for a combined magneto and common battery switchboard.

1,045,852. Lens and Reflector Retainer for Lamp Doors. W. T. Jones, assignor to Edmunds & Jones Manufacturing Co., Detroit, Mich. For an electric automobile lamp.

1,045,855. Telegraph-Tape Perforator. E. E. Kleinschmidt, Brooklyn, N. Y. Has electromagnets for operating the punches and feeding the tape.

1,045,859. Ignition Device for Gas Engines. L. J. le Pontois, New Rochelle, N. Y., assignor to H. W. Johns. An alternating-current make-and-break system.

1,045,862. Electric Battery. G. A. Lutz, Plainfield, N. J. Includes a circular metallic-oxide plate held in a special support.

1,045,866. Circuit-Breaker. J. N. Mahoney, assignor to Westinghouse Electric & Manufacturing Co. Has electromagnetic and manual tripping means and pneumatic closing means.

1,045,867. Trolley. P. A. McCullough, Pittsburgh, Pa. Has special contacts between the wheel and harp.

1,045,880. Battery. W. Petschel, Winnipeg, Man., Can. Has hollow cylindrical concentric carbon and zinc electrodes.

1,045,892. High and Low-Water Alarm for Steam Boilers. C. E. Robison, Harrisburg, Pa. Includes electric signals.

1,045,897. Switch. F. J. Seyerle, Pittsburgh, Pa. A self-opening knife switch controlled by a thermostat.

1,045,903. Electric Vehicle and Cable-Reeling Mechanism Therefor. W. L. Smith, Columbus, O., assignor, to Jeffrey Manufacturing Co. A trackless truck fed through a flexible cable whose slack is automatically wound on stationary reel.

1,045,909. Synchrorotor. E. G. Thomas, Brooklyn, N. Y. Includes a flywheel elastically connected to the rotor and electrical control mechanism therefor.

1,045,911. Electric Metal-Working Machine. E. Thomson, assignor to Thomson Electric Welding Co., Lynn, Mass. A work holder and current-applying terminal for welding machines.

1,045,913. Milk Agitator. W. P. Tinsley, Beecher City, Ill. A clock-controlled electric motor intermittently rotates the shaft.

1,045,925. Service-Meter System. C. S. Winston, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. For common-battery telephone systems.

1,045,941. Time Switch for Lighting Circuits. R. Buderer, H. Brönnle and C. W. Reich, Stuttgart, Germany. A single clockwork operates adjustable cams that actuate three switch-operating levers.

1,045,943. Machine for Handling Incandescent-Lamp Bulbs. W. R. Burrows, assignor to General Electric Co. A bulb-treating machine with two movable bulb holders and means for alternately transferring a bulb from one holder to the other.

1,045,948. Electrode for Welding. W. B. Cleveland and W. E. Huber, assignors to Electric Railway Improvement Co., Cleveland, O. For welding rail bonds.

1,045,953. Multiplex-Telegraph System. M. M. Davis and A. J. Eaves, New York, N. Y. Includes two generators and a pole changer for quadruple working.

1,045,959. Motor-Control System. J. Eaton, assignor to General Electric Co. Includes means for short-circuiting the armature by the whole or part of a braking resistance.

1,045,965. Lamp. W. H. Fulper, Flemington, N. J. Has incandescent lamps near the top of a vase-like stand and a shade over the top.

1,045,967. Transmitter Casing. F. Gottschalk, New York, N. Y. Has a screw adjustment for the resistance cell.

1,045,968 and **1,045,969. Telephone-Transmitter.** F. Gottschalk, New York, N. Y. Cover details of a special construction.

1,045,972. Section Insulator. F. Guillot, assignor to General Electric Co. Has a track for permitting a trolley wheel to pass the joint and two rails similarly for bow collectors.

1,045,975. Electric Water-Heater. C. O. Haskell, assignor to E. A. Strause, Chicago, Ill. Has a vertical heating element in the inner shell.

1,045,979. Switching Apparatus. E. C. A. Hoh, assignor to J. L. Howard, New York, N. Y. A mercury tube with three contacts is periodically rocked to change the current in two groups of lamps.

1,045,981. Safety Device for Electric Circuits. E. H. Jacobs, assignor to General Electric Co. Interconnection of the no-voltage devices and means for locking the switch against closure.

1,045,985. Cryolite-Rutile Composition. E. Kraus, assignor to General Electric Co. A self-reducing resistance material consisting of a solution of rutile in cryolite.

1,046,001. Electric Track-Switch. R. R. Miller, Pueblo, Colo., assignor of one-half to W. C. Darby. Electromagnetically actuated.

1,046,004. Vacuum-Tube Lamp. D. McF. Moore, assignor to General Electric Co. Has an internal non-arcing electrode of porous carbon impregnated with shellac.

1,046,024. Magnetic Brake. E. W. Robinson, assignor to General Electric Co. An electromagnet controls the movement of friction disks.

1,046,043. Method and Apparatus for Reducing Chemical Compounds. E. Weintraub, assignor to General Electric Co. Boron is produced by re-

ducing a mixture of a vaporized boron halide and hydrogen that is passed through an electric arc.

1,046,057. Electrical Control Mechanism for Driving Mechanism. C. A. Dresser, assignor to Goss Printing Press Co., Chicago, Ill. For changing from low to high-speed drive or the reverse.

1,046,066. Electric Welding. J. Harmatta, assignor to Thomson Electric Welding Co., Lynn, Mass. A spot-welding process for seams.

1,046,067. Means for Securing Conductor Terminals. G. W. Hart, assignor to Hart Manufacturing Co., Hartford, Conn. Convoluted spring sockets contracted by a clamp hold the insulated part of the conductors adjacent the binding-posts.

1,046,075. Woodworking or Routing Machine. G. L. Kelley, assignor to Kelley Electric Machine Co., Buffalo, N. Y. Is driven by a vertical electric motor.

1,046,081 to **1,046,083. Vapor Electric Apparatus.** C. A. Kraus and R. D. Mailey, Lynn, Mass. Includes a suspended anode, a mercury cathode and a reticulated screen between the electrodes.

1,046,067.—Terminal Sleeves and Clamp.

1,046,084 and **1,046,085. Joint.** C. A. Kraus, Newton Highlands, Mass. A gas-tight insulating joint between the electrode leads and the container of the preceding apparatus.

1,046,086. Vapor-Arc Circuit-Breaker. C. A. Kraus, Newton Highlands, Mass. Two arc check valves with auxiliary arc-maintaining devices are connected in parallel opposition in the alternating-current line.

1,046,096. Coin Slot-Machine. J. M. McClatchie, Huntingdon, Que., Can., assignor of one-half to R. E. Cogland. Has electric control for the coin arresters.

1,046,103. Electric Heater. L. F. Parkhurst, assignor to General Electric Co. The heating element is in a cup-shaped reinforcing chamber secured to the bottom of the vessel.

1,046,119. Automatic Oil Switch. H. L. Smith, assignor to General Electric Co. Relates to the levers and operating mechanism.

1,046,148. Electric Testing Apparatus. C. R. Butler, Carthage, Ind. Includes a flexible shaft and a pair of electrodes, one formed like a finger and the other like a protractor.

1,046,152. Arc-Lamp Globe. J. T. H. Dempster, assignor to General Electric Co. The inside of the globe is protected by a hard coat of translucent shellac varnish.

1,046,154. Trolley-Pole Stand. E. U. Down, Bowling Green, O. A ball-bearing turntable for the base of the pole.

1,046,182. Signaling System. F. Hardinge, Chicago, Ill. Describes the electric-signal-sending boxes.

1,046,211. Method of Making Electric Coils. J. L. Milton, Chicago, Ill. Cotton-covered wire and rubber tape are wound in alternate layers.

1,046,225. Signaling Device. C. A. Schindler, West Hoboken, N. J. A dry battery, lamp, buzzer and contacts are mounted on a glove.

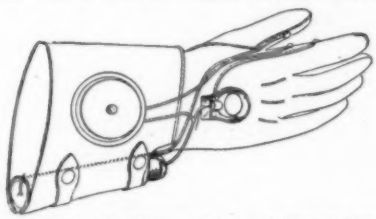
1,046,227. Electrical Connector. A. J. Seemann, assignor to Loeffelholz Co., Milwaukee, Wis. An electric train coupling.

1,046,235. Trolley. L. J. Tetlow, assignor to Universal Trolley Wheel Co., Northampton, Mass. Special contact springs engage the hub.

1,046,238. Lighting Fixture. F. W. Wakefield, assignor to F. W. Wakefield Brass Co., Vermilion, O. A four-sided socket-cover and shade-holder.

1,046,239 and **1,046,240. Electric Welding Machine.** F. Warren, assignor to Toledo Electric Welder Co., Cincinnati, O. The first patent relates to a plunger construction and the second to an adjustable die and holder therefor.

1,046,275. Electric Accenting Device for Pneumatic Musical Instruments. W. M. Davis and J. Hattemer, assignors to Hardman, Peck & Co., New York, N. Y. Electric contacts on the tracker bar are adapted to close an electric port-valve circuit.



1,046,225.—Audible and Visual Signal for Gloves.

1,046,288. Electrode of Secondary Batteries. H. Garde and A. J. Adams, London, Eng. Spiral plates are made by pasting, reducing to sponge lead, pressing, peroxidizing, discharging, reducing and pressing again and finally rolling to proper shape.

1,046,373. Safety Device for Machinery. R. B. Benjamin, Chicago, Ill. Provides electromagnetic control for the tripping mechanism of a punch press.

1,046,384. Switch. J. Gordon, Jr., assignor to Sireno Co., New York, N. Y. A rotary switch with a number of contacts.

1,046,391. Brake-Valve-Controlling Device for Vehicles. R. T. Jones and F. T. Jones, assignors to Jones Safety Train Control System Co., Baltimore, Md. Electromagnetic control for the air brakes.

1,046,409. Ice-Scraping Attachment for Trolleys. S. A. Bemis, deceased, by E. M. Bemis, executrix, Springfield, Mass. Has a number of transverse scraping ribs.

1,046,410 and **1,046,411. Mechanical Movement and Electric-Light Socket.** T. A. C. Both, assignor to Zee Socket & Manufacturing Co., Boston, Mass. The first patent covers a key shaft made of wire bent to form cams. The second patent covers a socket with reciprocating-button mechanism.

1,046,421. Process and Apparatus for Producing Chemical Reactions. J. L. R. Hayden, assignor to General Electric Co. A gaseous mixture is forced through an electric arc.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired December 10, 1912:

550,959. Electric Clock. B. Franklin, Chicago, Ill.

550,965. Electrical Conduit Railway. J. D. Griffen, New York, N. Y.

550,982. Harmonic Selective Signal for Party Telephone Lines. J. A. Lighthipe, San Francisco, Cal.

551,014. Electric Smelting Furnace, J. A. Vincent, Philadelphia, Pa.

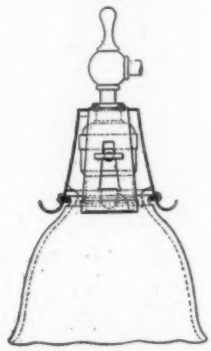
551,020. Electromagnet. S. T. Wellman, Upland, Pa.

551,021. Electric Rail-Bond. W. H. Wiggin, Worcester, Mass.

551,029. Electric Arc Lamp. W. J. Davy, London, Eng.

551,032. Cleat for Electric Wiring. J. R. Hemphill, Akron, O.

551,033. Commutator Brush. R. Hirsch and H. Meminger, Milwaukee, Wis.



1,046,238.—Socket-Cover and Shade Holder.

551,046. Electric Arc Lamp. F. N. Pike, New York, N. Y.

551,053 and 551,054. Electric Controller. Sidney H. Short, Cleveland, O.

551,056. Multiple Switchboard System. T. Spencer and T. C. Wales, Jr., Boston, Mass.

551,060. Telephone Circuit. J. S. Stone, Boston, Mass.

551,090. Signaling Apparatus. B. J. Noyes, Boston, Mass.

551,123. Successive Non-Interfering Signal Box. W. H. Kirnan, Brooklyn, N. Y.

551,145. Switch for Underground Electric Railways. A. Rosenholz, San Francisco, Cal.

551,170. Switch for Electric Plants. A. H. Lucas, Pittsburgh, Pa.

551,192. Telegraph Relay. A. D. MacDonald, Melbourne, Australia.

551,203. Electric Switch. J. E. Criggal, Springfield, Mass.

551,230. Composition of Matter for Insulating Purposes. R. B. Pratt, Hartford, Conn.

551,244. Electric Arc Lamp. W. P. Wiemann, Washington, Pa.

551,255. Machine for Reeling Cable. O. P. Briggs, Chicago, Ill.

551,275. Telephone Transmitter. J. Goodman and H. M. Goodman, Louisville, Ky.

551,284. Electric Sunshine Annunciator. L. Hunt and F. W. Duenckel, St. Louis, Mo.

551,334. Electric Railway. R. Lundell, Brooklyn, N. Y.

551,337. Electrode for Arc Lamps. T. G. Portis, St. Louis, Mo.

551,347. Telephone Receiver. A. C. Brown, London, Eng.